Rubber Journal and International Plastics

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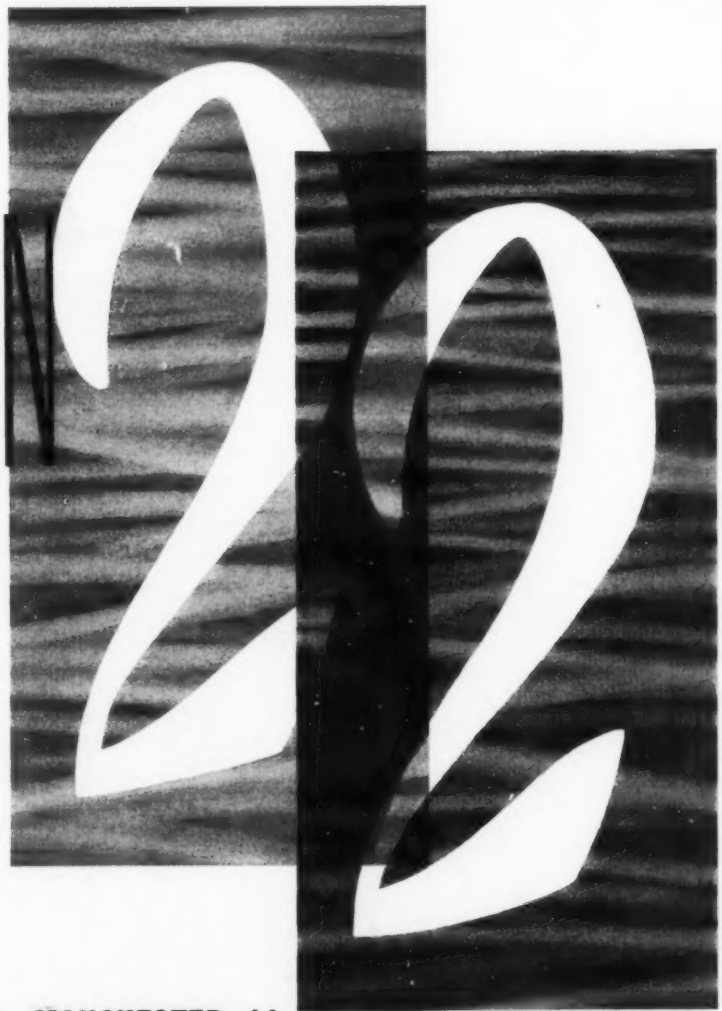

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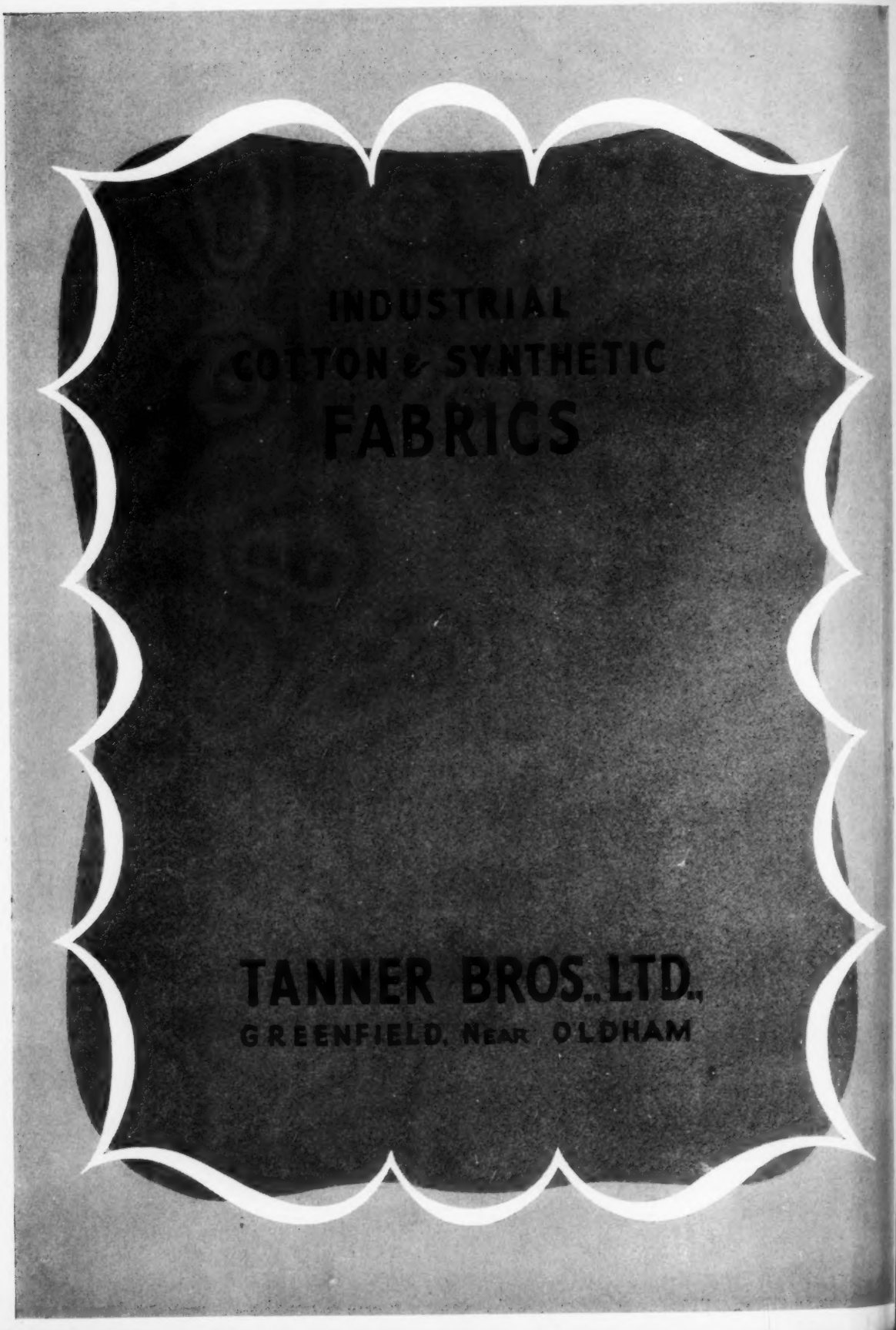
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IN ITS 75th YEAR

March 7 1959

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NOTES of the WEEK

Parallels and Degrees

WHILST in many ways the rubber and plastics industries are diverse, they are both founded on the same basic principles of polymer science and technology. Stressing the fact that they are in this respect parallel, Dr F. H. Cotton, Principal of the National College of Rubber Technology, at last week's Convocation of the College referred to the growing importance of the union of the two industries insofar as education and training of polymer technologists was concerned. He drew attention also to the lead taken by the Plastics Institute and the IRI in setting up a joint *ad hoc* committee to consider the possibility of a joint associateship examination with common papers. When it comes to training technologists in rubber and plastics the inseparability of the two has been amply demonstrated and, as Dr Cotton remarked, it is clear that there is an immediate need for a college of polymer technology, covering both fields with the greatest economy of teaching time and means—a theme which was supported by other speakers at the Convocation. That the National College is going a good way to fill this need is shown by the fact that in plastics the College had 80% passes and more candidates than any other technical establishment. These are most satisfactory results and the need for further expansion at the College has been fully recognized by the governors and extensions to the College are planned. Dr Cotton has taken a number of steps at the College to enhance its importance and standing, the holding of the Convocation being but one of them. It occurs to us, however, that nothing would do more to raise the prestige of technological training and to promote the flow of the best brains into science and technology than the raising of technological institutes to full degree granting status. Alone of all the industrial nations, Britain has no degree granting institutes of technology. No doubt, many university science faculties would oppose the granting of technological institutes of such powers. The most important single consideration, however, is whether full degree granting status would help to overcome the increasingly serious shortage of trained scientists and technologists.

Natural and Synthetic

THE importance of keeping natural rubber prices stable because of the competition from synthetic rubber was emphasized by Mr J. W. A. Calver, chairman of the Rubber Trade Association of London, in his annual report last week (page 370). Mr Calver said that, because of the big expansion in synthetic rubber production, it looked as if there must be a very big drive to increase consumption of synthetic over the next few years. It could be presumed that manufacturers would tend to use more at the expense of natural rubber if technical problems could be overcome. It would, admittedly, be foolish to overlook the dangers for natural rubber. From the short-term point of view, informed circles in the City believe that the price of rubber may rise to as much as 3s. per lb. in the next few months. This belief is based on Russia's reported inquiries in Malaya which suggest that she is going to lift even more rubber than she has been doing in recent times. The *Malay Mail* said recently that Russia's industrial programme for the next two years involved the use of ' huge ' quantities of natural rubber. Considering the more distant future, however, it is important to remember that full benefits have not yet accrued from replanting with the increased productivity per acre. Within the next few years the availability at an economic price of natural rubber should increase sufficiently to enable it to compete effectively with synthetic. Relative to other basic materials, and in the face of the US industrial recession, rubber displayed remarkable stability in 1958, and by the end of the year had almost recovered to the average level of around 26d. per lb. recorded in 1957. For five successive years world production and consumption of natural rubber have been in balance, as near as matters, and will probably continue to be so for some years to come. Mr Calver's fears are not without foundation and he has done well to warn rubber producers of the dangers of wide fluctuations in price, which might do permanent damage to the trade. Increased productivity and efficiency on the estates is, however, the best method to compete with the increasing consumption of man-made rubber.

Legal Hint

THE fact that there is no point of law to cater for the following case, described to us by a reader, is of interest. Mr B. was for some years employed by Mr A, who traded as ' Blank Co.' B resigned, and as he was not bound by a radius agreement, opened a similar business nearby. He traded under his own name, but on the fascia of his premises added ' Late of Blank Co.' A, for what he feels are good and sufficient reasons, dislikes this. Despite the fact that there is no law, in a particular case a court application could be made to restrain. For example, if the former employee had done something which made it reasonable for a firm to object to its being broadcast that he had ever been associated with them. In one case a manager who resigned and opened for himself in the same street painted his name and ' Late manager of ' in relatively small letters and the name of his old firm in relatively large lettering. The firm complained that on a quick glance people might think they were opening a new branch; a solicitor's letter was sent to the late manager, and the sign was altered.

NEWS *Briefs*

US POLYSTYRENE SALES — CHINESE MISSION IN CEYLON — ARGENTINE BUTADIENE PLANTS ASIAN JOINT RUBBER COUNCIL — UK DISPUTE

●**France**—Tyre exports from France in January totalled 3,171 tons against 4,762 in December and 3,835 in January last year, it was announced in Paris last week. Tyre imports totalled 413 tons against 601 in December and 874 in January last year.

●**Switzerland**—Formation of a wholly-owned subsidiary, Dow Chemie AG, in Basle, Switzerland, has been announced by The Dow Chemical Company. The company was incorporated with an initial paid-in capital of 25 million Swiss francs. The Board consists of Carl A. Gerstacker, vice-president and treasurer of The Dow Chemical Company, chairman; E. G. Renk, vice-president of the Union Bank of Switzerland, vice-chairman; C. B. Branch, president of Dow Chemical International Ltd. S.A.; Dr. W. R. Staehelin, Zurich attorney; and Dr Leo Fromer, Basle attorney.

●**United States**—Polystyrene sales in 1959 are estimated at about 450 million lb., about the same as in 1958. Indicated production capacity for 1959 of about 560 million lb. is well in excess of prospective sales and the industry is concerned about the possibility of further price softening which would squeeze present relatively low profit margins.

●**Ceylon**—An official Chinese trade mission is in Colombo negotiating prices and quantities to be exchanged in the current year under the Ceylon-China barter agreement. The second five-year barter agreement now in force provides for an annual exchange of 50,000 tons of Ceylon rubber for 200,000 tons of Chinese rice with an arrangement for settlement in sterling of any balance accruing to either party.

●**Indonesia**—A Russian trade mission has spent five days in Sumatra examining the possibilities of buying smallholder rubber, Antara news-agency reports. As an experiment, 500 tons of smallholder blanket rubber will be sent to Russia shortly.

●**Japan**—The Tokyo Rubber Exchange has announced that it will start trading in No. 1 RSS from March 2. The Kobe Rubber Exchange, in West Japan, has made the same decision. At present No. 3 RSS only is traded on the two exchanges. The reasons for the decisions are said to be that imports of rubber of grades above No. 3 have increased in recent years and that an increasing number of traders wished to hedge, the Exchange said. During the initial period there will be only two sessions a day, one in the morning and one in the afternoon, for trading in No. 1 RSS.

●**Malaya**—A Joint Rubber Council of all producing countries in Asia was proposed in a report published recently in Penang. Mr Tam Boon Peng, secretary of the Penang Rubber Trade Association, said that the association had advocated such a council for many years. He said it was understood that the matter was being seriously considered and Malaya might take a lead towards its fulfilment. The Council's discussions could include such matters as common problems inherent in the rubber trade and the exchange of knowledge and research.

●**United Kingdom**—A strike at the Dunlop rubber factory, Walton, Liverpool, ended on Monday afternoon when 1,000 workers returned to work. The strike began on the previous Friday after 160 men were threatened with the sack during the next nine months because of a big reorganization of production scheme. Workers demanded details of the plans and assurances of their security.

●**Argentina**—The Argentine Government has approved a proposal by Texas Butadiene and Chemical International Ltd. of Houston, Texas, to invest between 40 and 67 million dollars in plants to produce butadiene, styrene and lampblack for tyre and other rubber goods. It is understood the plants will be built near the Comodoro Rivadavia oilfields in Southern Argentina.

●**India**—Presenting his Budget last weekend, the Indian Finance Minister, Mr Morarji Desai, raised the excise duty on motor tyres to 40% *ad valorem* from 30%.

●**Malaya**—Japan is buying more Malayan rubber, according to statistics released in Kuala Lumpur on Monday. Shipments of all grades of Malayan rubber to Japan rose from 8,604 tons in December 1958 to 11,533 in January 1959. Rubber traders in Kuala Lumpur said the Japanese had apparently decided to buy Malayan rather than Thai or Indonesian rubber on the advice of the Japan Rubber Association. The traders said they expected shipments to Japan in February to exceed last month's.

'Serves you right—you would have that extra kipper for your supper!'—429

Heating and Ventilating*

THE USES OF PLASTICS

IN view of the articles that have appeared from time to time in the *RJIP* under the heading of 'Plastics at Work' and dealing with the use of plastics for fume extraction, it is particularly interesting to find that the Institution of Heating and Ventilating Engineers are examining and considering seriously the use of plastics in heating and ventilating equipment. Although certain points raised in this paper are controversial, they are reported without comment. Generally speaking the paper appears to have carefully examined the overall aspects and prospects.

Mr Tomalin, in the introduction to the paper, pointed out that the use of plastic materials was not, perhaps, as new as was thought and they had found many applications by virtue of their particular properties. During the war and post-war years the introduction of several ranges of new polymers had enormously widened the scope of plastics until today in the USA they ranked fourth in order of importance as a material of construction after metals, timber and glass.

This paper discussed both established and potential uses for various plastics materials in the type of installation with which the heating and ventilating engineer was concerned. Even a cursory glance at the vast amount of literature published in the plastics field would be sufficient to indicate that this subject could not be dealt with exhaustively within the limits of a single paper. The paper was mainly concerned with materials such as polyvinyl chloride, polythene and polyester/glass laminates which could be utilized for the fabrication of large single items of equipment or complete installations. Only incidental reference was made to those plastics such as phenolics, nylon or polytetrafluorethylene which were mainly used for special applications or as components of proprietary equipment.

Range Widened

Mr Tomalin emphasized that plastics were essentially new materials of construction, which served to widen the range available to engineers and enabled them to cover satisfactorily operating conditions for which the majority of conventional materials had proved unsatisfactory. Where plastics had been found suitable to replace conventional materials they did so by virtue of a definite superiority in some essential respect such as durability, ease of fabrication and installation, lower maintenance costs or, more rarely, lower capital cost. In no circumstances could plastics ever be regarded as an inferior substitute for conventional materials of construction.

Since plastics were homogeneous organic substances, their properties were quite different from those of metals or timber and they were not susceptible to the direct application of design techniques developed for those and other conventional materials of construction. It was essential to develop, and correctly to apply, proper design techniques for polymers such as PVC or polythene if these were to be employed in engineering construction with the maximum efficiency and economy.

In Mr Tomalin's experience, reputable firms in all phases of the plastics industry were invariably prepared to assist the ultimate user with information, advice and, where necessary, experimental work to evaluate the usefulness of their products for any particular application. It was appreciated that, because plastics were a relatively new group of materials, knowledge of their properties and design techniques was not as widely spread as was the case with, for example, the commoner metallic materials of construction, and this type of information was, at present, inevitably concentrated largely within the companies actively concerned with this field.

The author gave an outline of the properties of those plastics of most general interest to the engineer which, without being exhaustive, would serve to indicate their probable usefulness in any particular application. Four types of material were considered, polyvinyl chloride, polythene, polyester/glass laminates and polystyrene. While it was not possible to obtain accurate figures for the tonnage of each of these polymers currently entering industrial applications, it was believed that the order in which they were listed above was the order of their present importance as engineering materials of construction. It seemed possible, however, that, particularly with the forthcoming general availability of the linear polythenes, polyvinyl chloride could eventually take second place to polythene.

Furthermore, the engineering properties of fabricated sections could depend to a certain extent on the processing techniques employed. While, at first sight, these possible variations would appear to represent a considerable complication in the design of engineering equipment from plastics, in fact they offered a considerable advantage in the possibility of modifying properties to conform to a particular type of requirement.

Polyvinyl Chloride

Over the years improvements in processing techniques and increased knowledge of the behaviour of the polymer had made it possible satisfactorily to process rigid or unplasticized PVC. This material, although having very desirable properties in certain directions, such as corrosion resistance, had an impact strength too low for many applications. In order to overcome this disadvantage a high impact strength rigid PVC had been developed which, while retaining the desirable properties of the unmodified polymer, did not exhibit the greater softness and flexibility of the plasticized materials. Generally PVC was resistant to the action of acids and alkalis, fats, greases, natural oils and saturated hydrocarbons, and it was attacked by aromatic and chlorinated solvents. More complete details of corrosion-resistant properties were given in the following table together with similar data for other polymers. In using these data it was important to remember that, as with all corrosion problems, temperature, concentration of the active agent and various physical conditions, such as any stress to which the material may be subjected, could affect the corrosion resistance to a very marked extent.

Technical data were determined under very rigidly standardized conditions and were useful mainly to effect comparisons between different types of polymer. It was, therefore, not advisable to employ such test figures in the design of stressed

Extracts from a paper presented at the February 4 sessional meeting of the Institution of Heating and Ventilating Engineers by E. F. J. Tomalin, on the uses of plastics in heating and ventilating equipment.

equipment; for this purpose the International Standards Organization recommended stress loadings which incorporated suitable factors of safety. These were as follow:

Unplasticized PVC	850 psi (60 Kg/cm²)
High-density polythene	718 psi (50 Kg/cm²)
Low-density polythene	496 psi (35 Kg/cm²)

The paper itself dealt with polythene and its molecular make-up also pointing out the different types of polythenes now available made by various processes. The question of the effect of ultra-violet light on polythene was also dealt with as well as the very excellent electrical properties.

Polyesters were examined and their various properties, such as their temperature and chemical resistance, as well as the physical properties of the materials.

Various information was given on the use of polystyrene with particular emphasis on expanded polystyrene which is used in the building industry for temperature insulation properties.

Fabrication

A considerable section of the paper was devoted to fabrication of plastics.

Mr Tomalin pointed out that as with all other materials of construction, it was essential to have some understanding of the methods available for the fabrication of plastics in order to design equipment in these materials. Generally the techniques available fell into two divisions, those which could only be carried out in a specially equipped machine shop and those which required the minimum of equipment, frequently hand operated, and which could be applied on site during erection of equipment.

For large diameter pipe beyond the capacity of normal extrusion machinery it was sometimes possible to employ centrifugal casting. Essentially this was the same technique as was employed in the production of large-bore cast-iron pipes. The solid polymer in granular form was fed into a heated cylindrical mould which could be rapidly rotated. The polymer melted and was spun on to the internal surface of the mould as a uniform layer which solidified on cooling; pipe produced by this technique should have a good finish, be free from cavities and less liable to be affected by residual stresses than extruded pipe. It was, of course, only possible to use this technique where the flow characteristics of the molten polymer under the centrifugal forces developed were suitable. Large diameter pipe in both high- and low-density polythene had been produced commercially by this means.

In the case of the thermoplastics with which this paper was chiefly concerned, the most important fabrication technique, whether for shop or site fabrication, was welding, either solvent or thermal. Generally all except the smallest items of equipment were fabricated in this manner from sheet, tube and other standard sections preformed where necessary by rolling or bending. Solvent welding or the use of adhesives was at present applicable only to polystyrene and PVC, since polythene, particularly of the new high-density type, was almost completely impervious to solvents.

Reinforcement

In many larger items of equipment, such as storage tanks, it was frequently impracticable to fabricate entirely from plastic because of the problem of supporting large areas of comparatively thin sheet, particularly if any appreciable pressure differential was involved. Wall thicknesses for unsupported plastic in such cases would be uneconomical and might, in fact, be impossible to achieve because of the limitations on the production of very thick plastic sheets. This problem had been largely overcome by the introduction of a PVC sheet in which was embedded an expanded steel mesh as reinforcement. Under more extreme conditions where even this type of reinforcement was inadequate, the equipment could be prefabricated from mild steel and lined with plastic, either by the use of suitable adhesives and welding or by coating with a solution or flame spraying. In the last method a finely-divided powder was sprayed through a flame gun on to the surface to be treated and melted *in situ*, giving good adhesion and a continuous impervious surface. This method had been widely used, particularly in Germany, but there was inevitably a danger of degradation of the plastic through overheating unless rigid control was exercised. There was also considerable danger of faulty technique resulting in discontinuities in the plastic surface.

Applications

In dealing with applications the paper devoted some paragraphs to recapitulating properties which make plastics more suitable in a particular service than some of the more traditional materials of construction.

Of these the first was undoubtedly their generally high degree of corrosion resistance which enabled them to be used under many conditions for which no practicable metallic material of construction existed, and where glass or ceramics would be the only suitable alternatives. Both these latter materials were considerably inferior in mechanical strength and shock resistance to the most commonly used plastics. Even in services where a high degree of corrosion resistance was not necessarily required the freedom from atmospheric attack enjoyed by suitably compounded plastics represented a substantial advantage in reduced maintenance costs.

Some advantage was also frequently gained with the use of plastics materials through their low weight and ease of fabrication as compared with metals, glass or ceramics. An additional advantage lay in the high resistance to abrasion possessed by such plastics as PVC and polythene. This could best be instanced by the use of PVC piping for the conveying as suspensions in water of materials such as coke, cinders and slag, where it had proved superior to ferrous pipe. This same property enabled plastic pipe to be employed for vent systems heavily loaded with abrasive dust, or for pneumatic transport of solids.

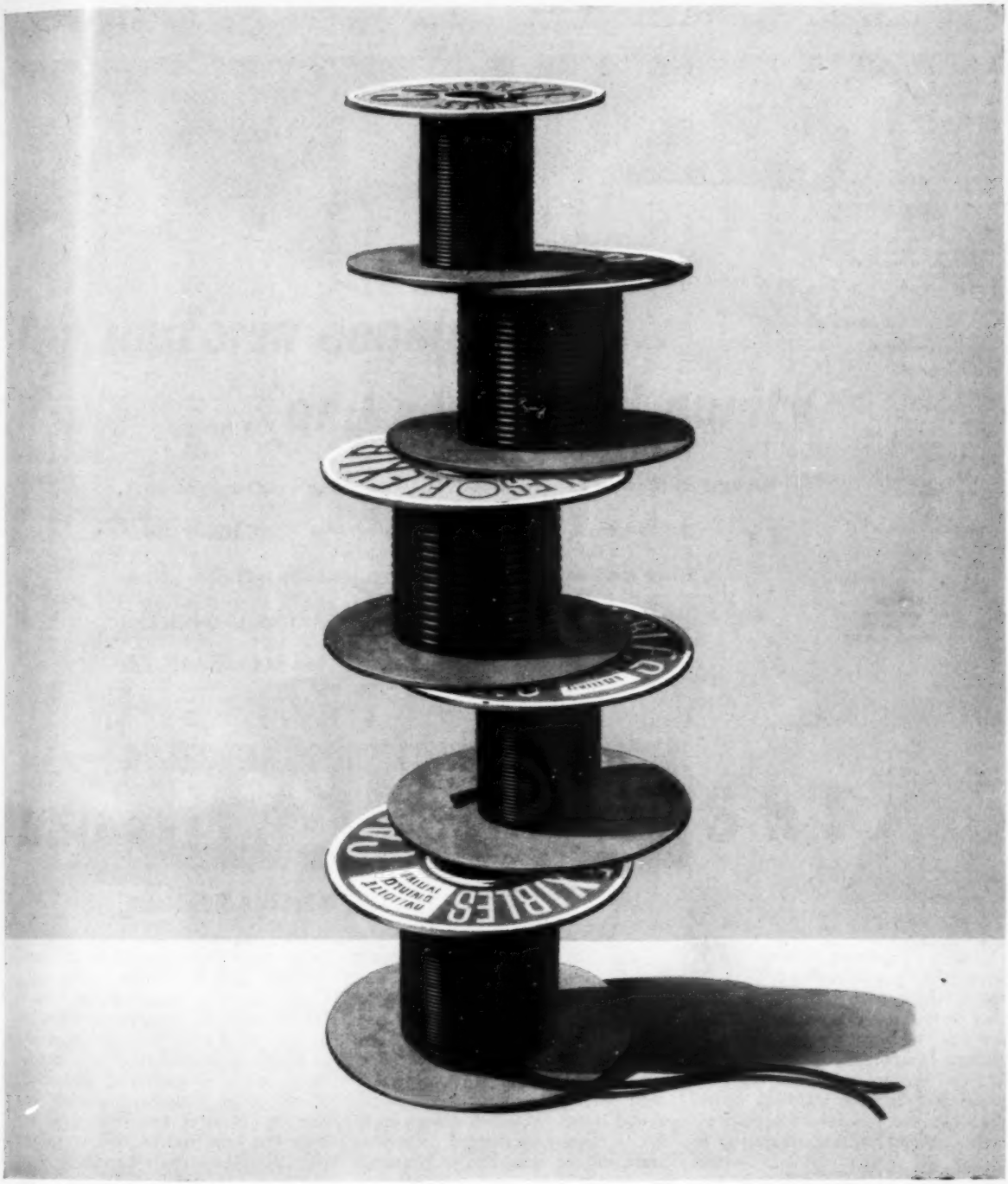
In view of these properties it was not surprising that one of the first large-scale industrial applications for these materials was in extraction systems for corrosive fumes. Many installations of this type had been in service for prolonged periods, notably in connexion with fume extraction from acid pickling baths in the metallurgical industries.

Laboratory Installations

Apart from fume-extraction systems in industrial plants, of which it would be possible to quote an almost indefinite number of examples, plastics were rapidly becoming of great importance in the more specialized field of laboratory installations. Polyvinyl chloride in particular had been found, by virtue of its corrosion resistance, toughness and non - inflammable nature, to be particularly suitable for the construction of the fume cupboards which form an essential feature of all chemical and many other types of laboratory. Fabrication of the cupboard itself in PVC results in a very light, durable and rigid structure, easily cleaned and requiring the minimum of maintenance. The sinks normally associated with a fume cupboard could also be fabricated from PVC, polythene or a polyester/glass laminate and, if desirable, the sliding windows could be glazed with a transparent plastic, such as Perspex, to reduce hazards resulting from an explosion.

Plastics had been widely used in fume stacks as well as the ducting associated with exhaust systems, sometimes as a lining to traditional materials and sometimes on their own.

Although the first application of



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	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C				
Acetaldehyde	L	L	S	U	S up to 40%	L	S	S	—	—	—	—
Acetic acid 10%	S	S	S	S	S up to 25%	L	S	S	S	L	S	—
Acetic acid 25-60%	—	—	—	—	S	L	—	—	S	—	—	—
Acetic acid vapours	—	—	—	—	S	—	—	—	—	D	L	—
Acetone	U	U	S	S	D	U	S	S	U	—	S	U
Acetylene	—	—	—	—	S	S	S	S	—	—	—	—
Acrylonitrile	—	—	—	—	S	—	—	—	—	—	—	—
Alcohols (most)	S	U	S	S	S	S	S	S	S	—	—	—
Aliphatic esters	—	—	S	S	U	U	S	S	—	—	—	—
Aliphatic halogen compounds	—	—	U	U	U	U	S	S	U	—	—	—
Ammonia anhydrous	S	S	S	S	L	L	S	S	S	—	—	—
Ammonia aqueous	S	S	S	S	L	L	S	S	—	—	—	—
Ammonium chloride	S	S	S	S	S	L	S	S	—	—	—	—
Ammonium hydroxide 5%	—	—	—	—	—	—	—	—	—	—	—	—
Ammonium hydroxide 25%	—	—	—	—	—	—	—	—	S	—	—	U
Aromatic acids	—	—	—	—	—	—	S	S	—	—	—	—
Aromatic solvents	U	U	S	U	U	U	S	S	—	—	—	—
Benzene	U	U	—	—	U	U	—	—	U	—	S	—
Bleach lye 12% free chlorine content	—	—	—	—	S	L	—	—	—	—	—	—
Brines saturated	—	—	S	S	S	S	S	S	—	—	—	—
Bromine gas weak conc.	—	—	—	—	L	D	—	—	—	—	—	—
Butadiene	—	—	—	—	S	S	—	—	—	—	—	—
Butyl alcohol 100%	—	—	—	—	S	L	—	—	L	—	—	—
Calcium chloride solutions	S	S	S	S	S	S	S	S	—	—	—	—
Carbon disulphide	U	U	U	U	L	U	S	S	—	—	—	—
Carbon tetrachloride	D	U	—	—	D	U	—	—	U	—	S	S
Caustic soda and potash	S	S	S	S	S	S	S	S	—	—	—	—
Chlorobenzene	U	U	—	—	—	—	—	—	U	—	—	—
Cyclohexane	U	U	S	S	U	U	S	S	U	—	—	—
Detergents, synthetic	S	S	S	L	S	S	S	S	L	—	—	—
Distilled water	S	S	S	S	S	S	S	S	S	—	—	S
Ethyl alcohol	U	U	—	—	S	L	—	—	L	—	—	—
Ethylene dichloride	U	U	—	—	U	U	—	—	U	—	S	—
Formic acid conc.	S	S	S	S	S	U	S	S	S	—	—	—
Glycols	U	U	U	U	S	S	S	S	S	—	—	—
Hydrochloric acid (10%)	S	S	S	S	S	S	S	S	L	—	—	—
Hydrochloric acid (conc.)	L	L	S	S	L	L	S	S	L	U	S	L
Hydrofluoric acid 40%	S	S	S	S	L	U	S	S	—	U	S	—
Hydrogen chloride gas, dry	—	—	—	—	S	S	—	—	—	—	—	—
Ketones	U	U	U	U	U	U	S	S	U	—	—	—
Methanol	—	—	—	—	S	L	—	—	L	—	—	U
Nitric acid (5%)	S	S	S	S	S	S	S	S	L	—	S	L
Nitric acid (<25%)	S	S	S	S	S	L	S	S	L	—	L	—
Ozone	U	U	U	U	S	D	S	S	S	—	—	—
Phosphoric acid (25%)	S	S	S	S	L	S	S	S	S	U	S	—
Phosphoric acid (95%)	U	U	U	U	S	S	S	S	—	U	S	—
Sea water	S	S	S	S	S	S	S	S	S	—	—	—
Sodium chloride	S	S	—	—	S satrd.	S	—	—	S	S	S	—
Sulphur dioxide, dry	—	—	S	U	S	S	S	S	L	—	—	—
Sulphur dioxide, wet	—	—	S	U	S	L	S	S	—	—	—	—
Sulphuric acid (10%)	S	S	—	—	S	S	S	S	S	—	—	S
Sulphuric acid (90%)	D	L	S	L	S	S	S	S	S	—	—	—
Trichlorethylene	U	U	U	U	U	U	S	S	U	—	—	—
Vinyl acetate 100%	—	—	—	—	U	—	—	—	—	—	—	—

plastics in ventilating systems was in those where corrosive fumes were involved, it was becoming apparent that they represented a very useful material for the fabrication of ducting in systems handling uncontaminated air for the ventilation of all types of buildings. In such buildings it was desirable, and was becoming increasingly common practice, completely to enclose the ventilating system within the building structure. As a result it was impracticable to inspect the ducting at regular intervals and to carry out painting or other maintenance necessitated by ordinary atmospheric corrosion. In such service, although both polythene and PVC would be suitable from the point of view of not requiring maintenance, PVC would normally be selected because of its non-flammable nature. The first cost of PVC ducting would naturally be higher than that of painted steel ducting of the same size, although it was possible that it would compare favourably with galvanized steel and would certainly be cheaper than rubber-lined steel. However, the initially greater capital expenditure would ultimately be more than offset by the lack of maintenance charges.

In many cases noxious fumes removed by an extraction system could not be finally discharged to atmosphere without some further treatment to remove toxic or corrosive constituents. This treatment frequently took the form of scrubbing with water or an aqueous solution. In such cases one or other of the available plastics frequently represented the ideal material to withstand the corrosive conditions obtaining.

After outlining the use of plastic materials as scrubbing tower packings, Mr Tomalin pointed out that the outer casing of the tower could also be fabricated in plastic if desired. In this case the same principles would apply as in considering materials of construction for any other equipment. Conditions of severe atmospheric corrosion, weight in certain locations such as the roof of a building, the necessity of reducing maintenance to a minimum, might all operate to indicate a plastic as the preferred material. In this connexion it was interesting to note that one firm of cooling tower suppliers was already producing the prototype of a small cooling unit the outer shell of which was in polyester/glass laminate.

Many of the applications in the heating and ventilating field for which plastics had a legitimate claim to be considered suitable materials, involved a certain amount of ancillary piping. Polyvinyl chloride and polythene were now finding rapidly increasing uses not only in piping for chemical plant where high corrosion resistance was required but in what might be termed

Continued on page 354

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Fifth Annual Convocation

NATIONAL COLLEGE OF RUBBER TECHNOLOGY

THE Fifth Convocation of the National College of Rubber Technology, took place on Thursday February 26 in the theatre of the adjoining Northern Polytechnic, Holloway Road, London. The proceedings were opened by the Chairman of the Board of Governors, Mr H. Rogers, who introduced the report on the National College, given by the Head, Dr F. H. Cotton.

Dr Cotton's main theme, which was supported by the other speakers, was the growing importance of the union of the rubber and plastics industries, in so far as it supported an agreed joint syllabus for the education of polymer technologists. A lead had been given by the Plastics Institute and by the Institution of the Rubber Industry, who had set up a joint *ad hoc* committee to consider the possibility of a joint Associateship examination with common papers in polymer science and in basic technology, but retaining specialized advanced papers in either rubber technology or plastics technology.

The large area of common ground between the two subjects had been amply demonstrated and it was clear that there was an immediate need for a College of Polymer Technology covering both fields with the greatest economy of teaching time and means. The National College of Rubber Technology was in an excellent position in this respect since it possessed not only the necessary staff and specialized equipment to teach both technologies but also the unique experience of the operation of full-time courses to Associateship level in both plastics and rubber.

Extension

However, the college was originally designed for a maximum of 90 full-time students; the present number of such students was 124 and an increase was expected each year for some time to come. This had posed the problem of physical extension of the building which was newly opened in 1953 and which was already too small for the existing staff to teach the new student intake with maximum efficiency. Such extension had been agreed in principle and it was hoped that dates for commencement of the work would be settled shortly.

During the year, the status of the College had been raised by the appointment of a Reader responsible for the direction of research, Mr G. N. Welding. The administrative work of the Head and of his senior staff had been lightened by the formation of a number of advisory committees and of a board of studies responsible for the organization of admission to courses, syllabus, examinations and other curricular matters. Liberal studies had not been neglected and the College organized a most successful student visit to Germany and Holland during the Easter vacation, 1958 (see *RJIP*, 1958, *134*, 841). This Easter (1959), a party would be visiting rubber and plastics organizations in Italy and France and there had been some consideration of the possibility of a visit to the US or to Russia during 1960 should the necessary financial support be forthcoming. The importance of the international tolerance fostered by these visits could not be over estimated and in this connexion, the arrangement of vacation work in European countries for National College students through IAESTE had also played a useful part. The death of Dr Symonds, Principal of the Northern Polytechnic and Director of the College, was recorded with regret, but the College was fortunate in having Dr Drakeley's valuable advice once more now that he was temporarily reappointed to his old post. Dr Cotton referred to the work of the Northern Polytechnic staff who are responsible for the teaching of pure science subjects to the National College students and also to the work of his own staff throughout the year. Finally, he took the opportunity of thanking the numerous firms and organizations who had made grants to students or to the college in the form of equipment or books and technical literature during the year.

The Chairman next called upon Dr J. W. Cook, F.R.S., Vice-Chancellor of Exeter University, and Chairman, Applied Chemistry Panel of the National Council for Technological Awards, to present the diplomas and prizes. Ten students gained the Licentiateship of the National College (LNCRT), 13 the Associateship (ANCRT) and one the Fellowship (FNCRT). This award of the Fellowship was to Mr D. Matthews for a thesis concerning the dielectric properties of zinc oxide and their application to dispersion problems, the form and standard of the thesis being similar to that required for the higher degree of a University. This was the first occasion in the history of the College that the award had been made to a non-graduate.

This year, the presentation was not restricted to internal awards but also the diplomas of the Institution of the Rubber Industry gained in the summer examination 1958 were included. Twenty-two students were awarded the L.I.R.I., among them Mr R. A. Aiken who gained the highest marks in this examination in the whole country, and 25 gained the A.I.R.I. In this examination, Mr K. S. Lee was placed second in order of merit for the whole country and he also won the Ronald Trist Award of £25 for the best work in the final year of the course. The British Geon prize of £25 was won by Mr P. I. A. Martin and the RUBBER JOURNAL prize of £25 for the best practical work in the second year of the Rubber Associateship course by Mr M. J. Turner.

Dubious Compliment

In his speech, Dr Cook struck a slightly jarring note by his continual emphasis on comparisons between the organization of a University and of a College of Technology. Having pointed out that in British University circles, the term 'Convocation' was reserved for gatherings of graduates who direct the policy of the University, he paid the College the slightly dubious compliment of comparing the present gathering with one he had attended in a tent at the Univeristy of Benares when diplomas were presented in the presence of 12,000 people. This event had also been termed a 'Convocation,' but it may be that Dr Cook intended the analogy to extend no farther! While congratulating the students who had received awards, Dr Cook made the important point that the foundation on which technology was built was pure science and that neglect of fundamental science subjects in the training of the technologist would soon result in his being rated as a technician rather than as an applied scientist. The cultural aspects of a College education were of the greatest

Some of those present at the Fifth Annual Convocation of the National College of Rubber Technology. 1, Mr R. J. Ceresa, Dr C. G. Moore, and Mrs and Dr L. Mullins. 2, Mr Fred Train, Dr J. T. Watts and Mrs Watts. 3, Dr W. Gerrard and Dr J. W. Cook. 4, Mr W. G. W. Bird and Mr D. A. Smith. 5, Mr H. Rogers and Mr G. E. Godfrey. 6, Mr Maldwyn Jones, Mr S. D. Sutton and Mr D. G. Franks. 7, Dr F. H. Cotton, Dr J. W. Cook and Dr T. J. Drakeley. 8, Dr H. Woolveridge, Dr C. S. Dingley

importance. At a University, the possibility of social intercourse with students in other faculties was a potential source of a broader outlook although in practice most students were found to make their friends within their own faculty. At a technological college this leavening was absent and it was therefore necessary to supply it, as it were synthetically, in the form of 'liberal studies,' such studies being now a requirement for the approval of courses leading to the Diploma in Technology.

In addition, the encouragement to travel abroad was to be commended since it stimulated interest in culture and language in a way not possible without direct contact between the student and the country of his study. The agency of travel seemed of paramount importance to Dr Cook and those present were led on a lightning world tour taking in the capitals of Europe, the Grand Canyon, Niagara and the Victoria Falls and finally swooping down precipitously into Central Asia. More women were required in technological courses, and on this happy note Dr Cook ended by expressing his good wishes to the departing graduates and reminding them of their responsibility to society.

To those who had hoped for some discussion of the status of the Dip. Tech. and its impact on the polymer industries, the speech was a disappointment and many of us felt that the comparisons with the University structure were invidious if only because they were not made fairly. For instance, the cultural world of the London student must of necessity be wide on account of the ready access to the theatre, opera, concert hall, art gallery, museum, and countless other valuable facilities afforded in the capital. While the major Universities offer alternative cultural facilities which none will deny, it is a matter of some controversy whether red-brick (or even sand-stone!) can yet compete in the provision of such facilities.

Vote of Thanks

A vote of thanks to the speaker was proposed by the Chairman and the proceedings were terminated by Dr Drakeley who proposed a vote of thanks to Mr Rogers in the Chair, during which he recalled that it was forty years since he had first received Mr Rogers' enthusiastic support in the teaching of rubber technology and that this support had continued unrelaxed right up to the present. Dr Cotton announced that a conversazione was being held in the College and invited the audience to attend. The majority did so and witnessed the operation of much of the new machinery (including the blow-moulding of polythene bottles), laboratory demonstrations and the usual internal television display. The attendance was a record and the number of ladies present suggests that this conversazione is proving a useful event in the social calendar of the polymer industry.—D.A.S.

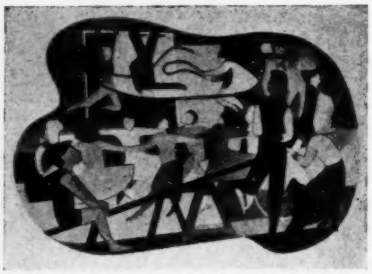
HEATING AND VENTILATING

Continued from page 350

plumbing applications. In these cases where the liquid involved was frequently water or aqueous wastes, plastics materials could be selected on the grounds of superior durability to ferrous metals, negligible maintenance costs, appearance and ease of installation. In many instances the actual installed cost could compare favourably with conventional materials and the true cost, including maintenance over a period of years and taking the life of the installation into account, should be considerably lower.

Mr Tomalin summarized the present position by saying that it was apparent plastics of all kinds had won an established place as engineering materials of construction. In certain applications, mainly special components of items of standard equipment, this was of long standing. In the more spectacular instances, involving the fabrication of complete installations, advances have been made mainly in the last few years. In this respect practice in the United States and Germany was probably rather in advance of that of British industry, partly owing to the earlier availability of some of the newer thermoplastic polymers in these countries and partly, in the case of Germany, because of an over-riding compulsion during the war years to find alternative materials to the metals. Nevertheless the techniques and knowledge available in this country on the employment of plastics in engineering applications were in no way inferior to those in either the US or Germany, the difference lay mainly in the fact that in these latter countries industry generally had had a longer experience of, and therefore more confidence in, the use of plastics in engineering applications.

For the future it was possible to look forward with confidence to a continuing and considerable increase in the use of these new materials both in those fields where they had already proved their value and in new developments which had been hampered so far by the lack of a suitable material of construction.



'Children at Play,' a mural made of sections of laminated plastic, was commissioned by the New York Board of Education for installation in PS8, a new school in Bronx, NY. The designer, S. Van Veen, was asked to create a mural which would be permanent, tough and easily maintained. Working with the Formica Corporation, a subsidiary of American Cyanamid, he made a pencil sketch small enough to fit into a projector. The sketch was projected to actual size on a giant sheet of white paper, attached to a wall. The artist then pencilled the image onto the large sheet. Each section of the pencilled mural was numbered to correspond with a specific colour and shape of Formica. Then the sections were cut out and used as templates for shaping the Formica pieces of the proper colours. These pieces were assembled and cemented to a plywood backing according to instructions supplied by Van Veen. There are a total of 288 Formica pieces, each of a different shape

The table on p. 350 contains a selection of available data on the effect of various solvents and corrosive conditions on representative plastics. In each case the attacking chemical is in the physical state normal to the temperature conditions at atmospheric pressure. The following indications of suitability of a polymer for use with a particular material are employed:

S=Satisfactory.

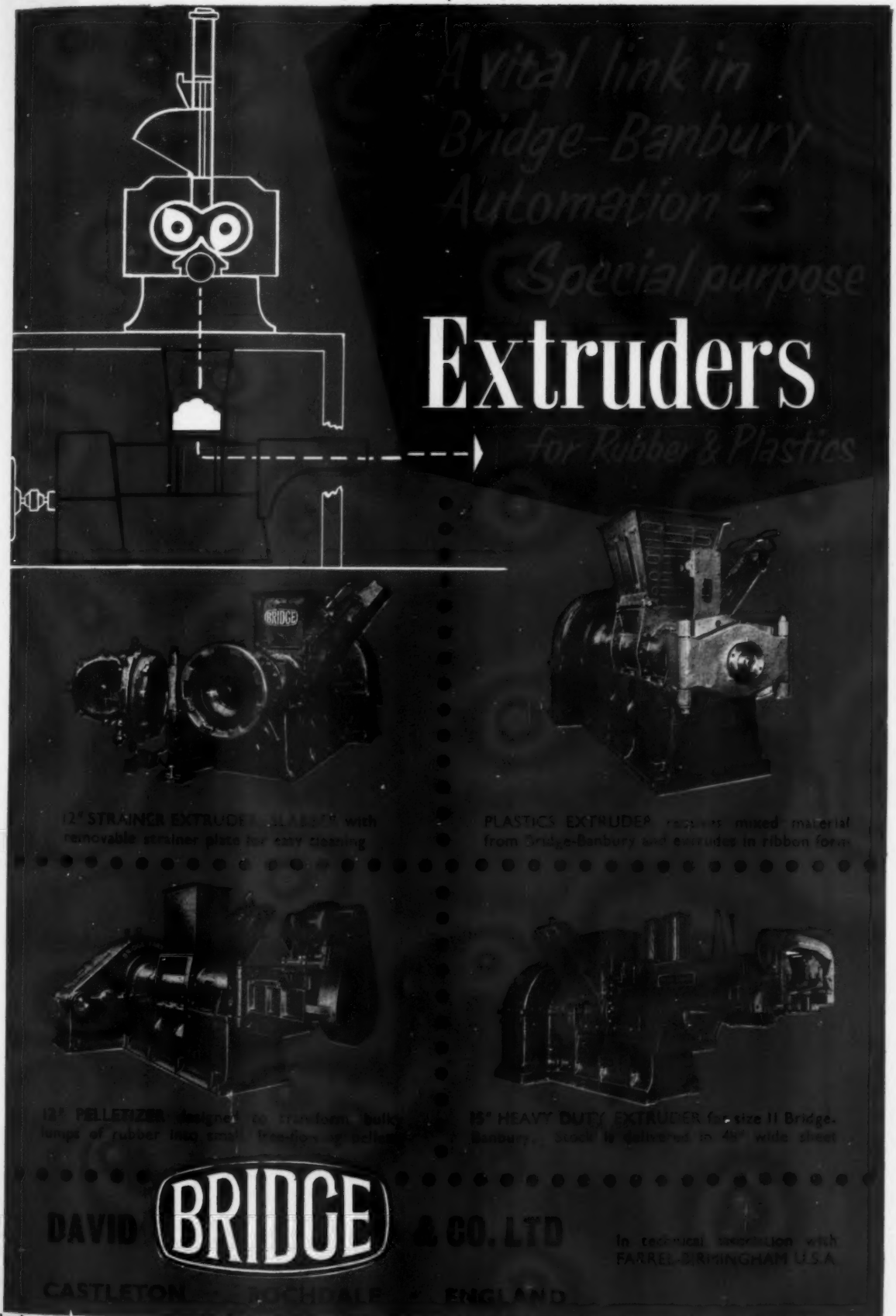
L=Satisfactory for limited applications.

D=Doubtful; experimental work not complete and data insufficient for a definite statement.

U=Unsatisfactory.

The absence of any indication for a particular combination should not be taken to imply unsuitability, merely lack of information. In such cases further experimental work would be required.

The information contained in this table was believed to be accurate and had been collected from reliable sources. However, as with all corrosion problems, a great deal depended upon the precise physical environment and these data should be employed as a guide to suitability in conjunction with actual laboratory tests in cases of doubt.



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Electrical Breakdown

ELECTRICAL PROPERTIES OF HIGH POLYMERS—5

THE penultimate lecture of this series was given at the National College of Rubber Technology on the evening of Wednesday February 4 by Mr C. G. Garton, M.I.E.E., F.Inst.P., of the Electrical Research Association. Mr Garton's subject was the 'Electrical Breakdown of High Polymer Materials.'

Up to a few years ago, ideas on this subject were very simple. By means of two electrodes, a voltage was applied across the specimen, of thickness t cm., and if breakdown occurred when the applied voltage was V volts, then the breakdown strength was defined as V/t volts per cm. It was now realized that this idea was much too simple. For example, the answer obtained for a given polymer depended upon the circumstances of the test. If the test was carried out under oil or under a relatively conductive fluid, different answers would be obtained in each case. Similarly the results depended upon the thickness of the specimen. This was not satisfactory, since V/t should be a property of the material itself to be of any value, and not a function of the test method.

Intrinsic Electric Strength

After about 1935 it began to be realized that the real electric strength of a material was greater than the value of V/t obtained by the simple method. This latter gave breakdown strengths of between 10^5 and 10^6 volts/cm. for most materials, but when the measuring technique was improved, values of 10^7 or higher were obtained. Over the last twenty years the various factors which contributed to the electrical breakdown had gradually been identified, and when tests were carried out in such a fashion that the real electric strength of the material was being measured, then higher values were obtained, and this higher value for any material was called its intrinsic electric strength. Mr Garton listed the various factors which effected the measured breakdown strength of a material as follows: (a) electro-mechanical, (b) thermal instability, (c) thermal and chemical, (d) slow erosion, (e) channel propagation, (f) surface erosion, (g) tracking, (h) electrochemical. Factors (b) to (g) are effects of the discharge, whilst (h) is due to electrolysis.

Some idea of the mechanism of breakdown could be obtained by considering what happened in the case of a single crystal in an electric field. The phenomena of breakdown could be explained from the drifting of the electrons through the crystal lattice. While such a theory could lead to satisfactory results for a simple structure, indicating, for example, that the electric strength should increase with temperature, it could not be applied to high polymers. Mr Garton exhibited curves for fused and crystalline quartz, showing how the electric strength increased with temperature for the quartz, and decreased for the silica, whilst curves for polythene showed how the electric strength remained constant up to about room temperature, and then decreased with further rise in temperature, although this decrease was now considered spurious. The most resistant polymer was polyvinyl alcohol, which had an intrinsic electrical strength of about 15.10^6 volts/cm.

The lecturer next dealt with the techniques of measurement. To measure the intrinsic electric strength it was important that discharges be eliminated. This was done by obtaining optical contact between the electrodes and the polymer. A small hemi-spherical depression was made on the surface of the test material, using a ball bearing in a device described by the lecturer, and this depression was vacuum coated with silver or gold. When the electrodes were fitted, the thickness of the material under test was one 'thou.' The secondary effects listed above were then considered in turn, so that it could be appreciated how they could influence the test result.

The electro-mechanical effect could be explained quite simply as the squeezing of the specimen by the electrodes because of the electrical attraction between them when they were charged. If F was this force of attraction in dynes/cm.^{2} and k the permittivity of the test material, then $F=(k/8\pi).(V/t)^2$. This force was about one atmosphere for each megavolt, so that the force acting on the material during test could be over a hundred atmospheres. In some cases this could lead to an appreciable decrease in the value of t giving an erroneous value for the electric strength. The effect was accumulative, since as t decreased F increased, so that the more the material yielded, the greater the compressive force, and this could lead to premature breakdown. This could be the case when plastics materials were tested at higher temperatures, and could be the cause of high temperature breakdown.

Discharge effects were next considered. A spark could jump from the electrode to the surface of the test material. The end of this discharge was pointed, and had an equivalent temperature of several thousand degrees centigrade. This discharge eroded the surface of the polymer causing pit formation, the inside of which could be carbonized. Because of the pointed nature of the end of the spark, a discharge could take place from there through the material, or else the formation of a pit could decrease the thickness of the test piece, helping the breakdown to occur. Breakdown due to pits and voids had been extensively studied at ERA by controlled discharges inside artificial voids in plastic materials. The presence of voids was the cause of breakdown in cables. Mr Garton showed a number of slides illustrating these points, and of particular interest were the propagation channels starting from the bottoms of erosion pits.

Tracking Phenomena

The phenomena of tracking was the next point dealt with by the lecturer. This depended mainly upon the chemistry of the surface, and was caused by the formation of permanent carbon tracks, but was not well understood at that time, especially in the case of rubbers.

Finally, electrochemical breakdown was considered. This was more marked in the case of direct currents than for alternating ones. It was not very important for polymers, and, as in the case of tracking, it was mainly a function of the chemistry of the material.

In the discussion which followed this lecture, Mr Garton answered questions about the mechanism of tracking, and breakdown in cables. During this lecture some interesting experimental work was described, and it is to be hoped that Mr Garton will soon be able to publish his results in more detail, since it is impossible to do justice to his lecture in this brief survey.

Dunlop Golf

This year's Dunlop golf tournament, which is being played at Royal Lytham and St. Anne's from May 6 to 8, is being reduced from a 90-hole to a 72-hole event. This is being done to bring it into line with other major golf tournaments. Prize money is being increased by £60 to a total of £2,750.

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VIEWS and REVIEWS

Viscosity-Equilibrium Swelling Correlations

PUBLICATION No. 294 of the British Rubber Producers' Research Association is a paper on the 'Viscosity-Equilibrium Swelling Correlations of Natural Rubber' by G. M. Bristow and W. F. Watson, which originally appeared in the *Transactions of the Faraday Society (1958, No. 430,* Vol. 54, Part 10, October 1958).

In this research the authors sought for a correlation between the limiting viscosity numbers of a rubber sample in 21 solvents, and the equilibrium swellings of a cross-linked network of the rubber in the same solvents. In their introductory summary the authors, after stating that the Flory-Fox treatment of viscosity and the Flory-Rehner treatment of swelling, were applied to the data, 'but the lack of knowledge of the variation with concentration of the polymer-solvent interaction parameter χ which both theories involve, precludes a direct treatment of these treatments,' and 'One set of data cannot, therefore, be accurately predicted from the other.'

Nevertheless, 'trends in the variation of the parameter from good to bad solvents have been detected.' In addition, the authors have interpreted the fairly regular change of viscosity with swelling for the different solvents.

Experimental

A few words regarding experimental methods may be of interest: In the case of *Raw Rubber* the sample was lightly milled, and then stored in the dark at −30°C. The *Vulcanized Rubber* was cross-linked by the incorporation of 3% dicumyl peroxide on the mill and heating at 140°C. for 50min. in a mould. The 2mm.-thick sheets so obtained were extracted with hot acetone for 24 hours at 10^{-2}mm. Hg. pressure and 40°C. This material was also stored in the dark at −30°C.

This is a paper which should especially interest physical chemists.

High-Speed Fracture in Rubber

'High-Speed Fracture in Rubber' is the title of an interesting paper by Peter Mason (BRPRA), which forms part of the research programme of the Board of the British Rubber Producers' Research Association, and constitutes their Publication No. 295.*

Main Purposes of Paper

After an account of the previous literature (with nine references), which should repay careful scrutiny, the author states that 'The main purposes of the present paper are to describe some observations of tearing in rubber at speeds approaching the speed of sound; to show how the fracture markings on the torn surfaces are associated with changes in the rate of tearing; and to examine how far the maximum tearing rates observed agree with the values predicted by the Mott theory.'

Some Experimental Points

Cinematograph observations were made of crack propagation under well-defined boundary conditions in rubbers up to speeds of 30m./sec.

A figure (No. 1) in the paper shows schematically the arrangement used for producing fracture in thin rubber sheets. The specimen was approx. 25cm. long and 1mm. thick, and this was clamped on its two major edges with an initial clamp separation of about 1cm. By uniform increase of separation the specimens could be stretched to the desired extent substantially in pure shear (departures from this condition occurring in the immediate vicinity of the clamps and the free edges). GR-S specimens had to be extended fairly rapidly, and this was done by means of a piston actuated by compressed air, and tested at once to obviate tearing at the clamps. With regard to fracture, this could then be initiated by cutting into the material at a free edge, and 'it was found that the resulting crack invariably propagated linearly along the axis. Progress of the crack was recorded on 16mm. film at approximately 2,000 frames per second.'

Fracture Markings

It is noteworthy that the fracture markings showed resemblances to those obtained with metals, plastics, and glass, and could be related directly to the corresponding speed of fracture propagation. Moreover, in close analogy with Schardin's observations on glass (*see original for ref., etc.*), a non-crystallizing rubber (namely GR-S) showed a mode of crack propagation in which the fractured surfaces were visually smooth, and the speed was about one quarter of the speed of longitudinal elastic waves. On the other hand, a crystallizing rubber (natural rubber) did not show this mode of propagation under the test conditions used.

Classification of Solid Fracture

Mason suggests that the modes of solid fracture can be usefully classified in three categories, namely:

(1) slow propagation, generally with smooth surfaces, obtained by careful control of the boundary conditions;

(2) propagation at intermediate rates with rough surfaces involving correspondingly greater energy consumption;

(3) fast propagation with smooth surfaces, the rate of propagation being limited by the speed of elastic waves in the material in accord with Mott's theory.

(*Note:* The author expresses his gratitude to Mr J. E. Roberts of the Armament Research and Development Establishment, Ministry of Supply, for providing facilities and help with the cinematography.)

(*Figures in Text:* Fig. 1, as described above; Fig. 2, Crack propagation in GR-S; Fig. 3, Fracture sur-

* The paper has been 'Reprinted from *Journal of Applied Physics,* Vol. 29, No. 8, 1146-1150, August 1958, Copyright 1958 by the American Institute of Physics, printed in USA.'

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **DR SCHIDROWITZ**

faces in GR-S (a to f inclusive); Fig. 4, Crack propagation in NR; Fig. 5 (a, b, c), Fracture surfaces in NR; Fig. 6, Tensile fracture (a, b), in NR; Fig. 7 (a, b), Tensile fracture in GR-S.

Speed of Mixing

'The mixing of ingredients is one of the fundamental steps in the preparation of rubber compounds and any increase in the speed of this process is of great significance to the rubber industry.'

There will scarcely be any tendency to disagree with these words, which constitute the opening sentence of 'Speed of Mixing Rubber as a Factor in Processing,'* by N. V. Priklonskaya (State Institute of Planning for the Rubber Industry).

The above introductory remarks are succeeded by an explanatory statement—referring, it appears, to both the current tendency and/or also to the author's work:

The following methods are being put into practice for speeding up this process:

1. The use of mechanical weighing and loading of the materials used in the mixing process.
2. Increasing the speed of rotation of the mixing rotors and applying higher pressures to the mixing chamber.

'External' Practice

Discussing industrial practice in countries outside Russia (at the time of writing) as it appeared to the author, the latter remarks:

In foreign countries the rotor speed is increased from 20 to 30, 40, 50 and in some cases 60 rpm. The pressure on the mixing chamber is increased from 0.5-1 to 4 or 5 and sometimes 10 kg./cm^2. The most useful type of foreign construction is a two (odd) speed mixer in which mixing time is considerably shortened.

The Literature

It seems to me that the author's remarks on the 'literature' are interesting, especially in view of the pretty voluminous commercial or technical information devoted to publicity and the like. Possibly the author refers to strictly scientific data quite outside the sphere of publicity. In any case, his views are expressed as follows:

'There is very little literature concerning the process of mixing. What there is does not give the experimental materials or a complete presentation of the mechanism of mixing of rubber with the fillers. Therefore it may be useful to give the fundamental results of our work which was done in the NIIShP Laboratory in 1954-55.

'This work was devoted to a study of some characteristics of mixing of SK (synthetic rubber) as a function of mixing speed, the influence of technological factors on dispersion of ingredients and the effect of higher mixing temperatures on the properties of compounds of synthetic rubbers.'

Laboratory and Industrial Conditions

Information regarding comparisons between laboratory results and those observed under industrial or service conditions are, I consider, always welcome. It is, therefore, interesting to note that in the research under review some of the work carried out in an experimental mixer (capacity about half gallon) were compared with those recorded for factory operations. Thus:

(a) In the introductory remarks (p. 908) it is stated that 'In this work it was kept in mind that the mixing process in the laboratory and in industry should be carried out under the same environmental conditions' and, in a following section on 'Influence of Technological Factors in the Mixing Process . . .' (*on dispersion and on speed*), on p. 911, it is mentioned that 'Operation by the method of mixing in which the time of mixing of separate portions was decreased under the industrial conditions of NIIShP, in slow speed mixers, gave positive results and confirmed our conclusions.'

(b) In further exemplification, under a 'shoulder heading' (p. 912) '*Pressure of Mixing*,' a reference to a following table (VI) says: 'These experiments were done in the laboratory and under industrial conditions in the standard slow speed mixer.' A following remark (to the said *Table*) is: 'Under industrial conditions a doubling of the pressure on the rubber (from 0.5 to 1kg./cm.^{2}) did not lead to noticeable shortening of mixing time or improvement of dispersion.'

Conclusions in Section 1

In abbreviated form, some of the Conclusions in (as termed by the reviewer) Section 1 (pp. 907-912) are as follows:

The *dispersion of black* is not accelerated by increasing temperature of mixing, but by faster mechanical agitation of the mass. At mix. temps. above 140°C. dispersion of black is somewhat worse owing to increased plasticity.

With loading method constant, the *time of mixing* is inversely proportional to rotor speed.

Increased rotor speed prevents agglomeration of powders, shortens working time (in stepwise loading), and makes practicable mixing when ingredients are added in one step.

Mixing in minimum time (1.5 to 2 minutes), occurs at a low temperature, with one step loading and doubling rotor speed.

An increase of pressure on the mix is most effective with short mixing cycles, with one step loading, and when mixing is at a low temperature.

In the Second Section (pp. 914 to 920) it may be noted that although, as stated in the introduction, the work was designed essentially to examine certain synthetic rubber characteristics, there is a reference in one sub-section (*cf.* Fig. 6, and discussion on pp. 916/7) to natural rubber as a control in relation to SKS-30AM; SKB, and SKS-30A and relative mixings, in a discussion on changes in 'Mooney' at different temperatures. In this set, NR was compared with typical tyre industry compounds containing domestic synthetic rubbers,* namely tread compounds of butadiene-styrene rubber SKS-30A, and SKS-30AM (oil-extended) as well as carcass compounds of sodium-butadiene rubber, SKB.

* Translated by Theodor Tarasjuk, Katherine and Willard P. Tyler for *Rubber Chemistry and Technology* from *Kauchuk i Rezina*, 1957, No. 4, pages 9-19. (cf. *Rubber Chemistry and Technology* 1958, xxxi, No. 4, pp. 907-924.)

* Explained on p. 908.

Continued on page 365

Questions Corner—62

(Second Series)

267. What are the various methods that can be used for vacuum forming cellulosic film?

268. Are polyvinyl acetate emulsions stable in storage, applications, etc.?

269. What are the main advantages and disadvantages of using fillers in PVC paste formulations?

270. Why is it desirable to add powder type stabilizers in the form of dispersions, or pastes, with plasticizer?

(Answers next week)

Answers to Questions Corner—61

263. Both methyl cellulose and carboxymethyl cellulose are used in the food industry for the important reasons that they are: a. Odourless, tasteless, colourless and non-toxic. b. Being water soluble they are easy to use and are good thickeners for other aqueous systems. c. Good stabilizers and emulsifying agents. d. Excellent retainers of moisture. They may be used with, or to replace, natural gums and are a valuable aid in the preparation of dehydrated foods, facilitating the reconstitution of the product.

Methyl cellulose, mixed with sugar, may be sifted on to the surface of fresh fruit which is to be subsequently frozen. It acts as a stabilizer on the water in the fruit until it is completely frozen. The non-ionic nature of the methyl cellulose prevents it affecting the acidity of the fruit when used in pies.

Other advantages of methyl cellulose include the increased tolerance to changes in flour characteristics, greater uniformity of batches, and controlled grease absorption in certain pastries. Carboxymethyl cellulose is also used in similar applications, as a water binding agent, as a stabilizer and as an additive prior to dehydration of certain food products. It has been found to be of advantage in ice cream for maintaining the creamy condition and inhibiting the formation of large ice crystals.

264. The most important factors which affect the choice of stabilizers for polyvinyl chloride are the types of raw materials used, processing conditions and the service conditions of the finished product.

Resin. Several types of chlorinated resins are used: a. Polyvinyl chloride. b. Vinyl chloride-acetate co-polymers. c. Vinyl chloride - vinylidene chloride co-polymers. Each of these types presents a separate stabilization problem. Variation in the ratio of the constituents of the co-polymers, molecular weight, etc.

Plasticizers. These will affect the stability of the resin to a considerable degree, some types reducing the stability by as much as 30%. Others improve the stability.

Pigments and fillers. These may affect the stability of the vinyl system. Some pigments, such as titanium dioxide, act as screening agents and increase the light stability. Certain types of filler, usually basic, reduce the light stability or affect the activity of the stabilizers in the system.

Processing. The time and temperature of processing are probably the most important factors to consider. Stabilizers can also affect the internal lubricity or plasticity, as well as the external lubricity or the property which reduces friction or adhesion between the material and working surfaces.

Service Conditions. a. Where good light stability is required. b. Non-toxicity where contact with foodstuffs is required. c. Sulphur staining may occur when the vinyl material contains metallic stabilizers which react with sulphur to form dark compounds. Sulphur may also be present in some foods.

265. There are several factors which affect the strength of fabric based laminates in relation to the fabric itself.

Cloth weight. Generally, the tensile strength of a laminate varies immensely with the weight of the fabric used, *e.g.* if one uses a fabric weighing 8oz. per sq. yd., with 40 ends and picks, the tensile strength of a similar laminate will be much lower than one made with a 4oz. fabric, with 70 ends and picks.

Yarn twist. A tightly twist yarn restricts the penetration of the resin used for impregnation. A fabric woven from tightly twisted yarns which are soft and easily impregnated may not be so strong in itself, but will produce a strong laminate.

Crimp. Crimp tends to reduce the tensile strength and increase the shear strength of the laminate. The irregularities produced on the surface of a fabric by the crimp of the crossing threads assist the bonding when used to form the laminate.

Weave. A balanced weave having the same number of picks and ends, will produce a laminate having approximately the same tensile strength in both the transverse and longitudinal directions. The strength of the laminate can be increased in one direction by using a fabric with greater number of ends than picks.

266. There are two types of rigid polyvinyl chloride. One is an unmodified polymer, or essentially so, and is processed with only a small percentage of essential additives such as a stabilizer and possibly some lubricant. The other type is a compound of polyvinyl chloride and nitrile rubbers with stabilizers, lubricants and, for some purposes, fillers may be added. Rigid PVC has very good corrosion resistance and this is somewhat greater in the case of the unmodified type, as would be expected, and also its greatly improved chemical resistance in 80% sulphuric acid, 60% nitric acid and 50% hydrogen peroxide, compared with the second type.

Both types may be used for piping, tank linings, ducting, etc., and the high impact strength, chemical resistance, relatively high heat distortion temperature, non-flammability, non-toxicity and dimensional stability characteristics increase their usefulness. Rigid sheet and extrusions are also produced with lower molecular weight polymers, or from unplasticized polyvinyl chloride-vinyl acetate copolymers. A major outlet has recently been in the installation of rigid PVC pipe in the ships of the US Navy wherein the pipe is used to transport sea water to wash down ships in the case of atomic attack.

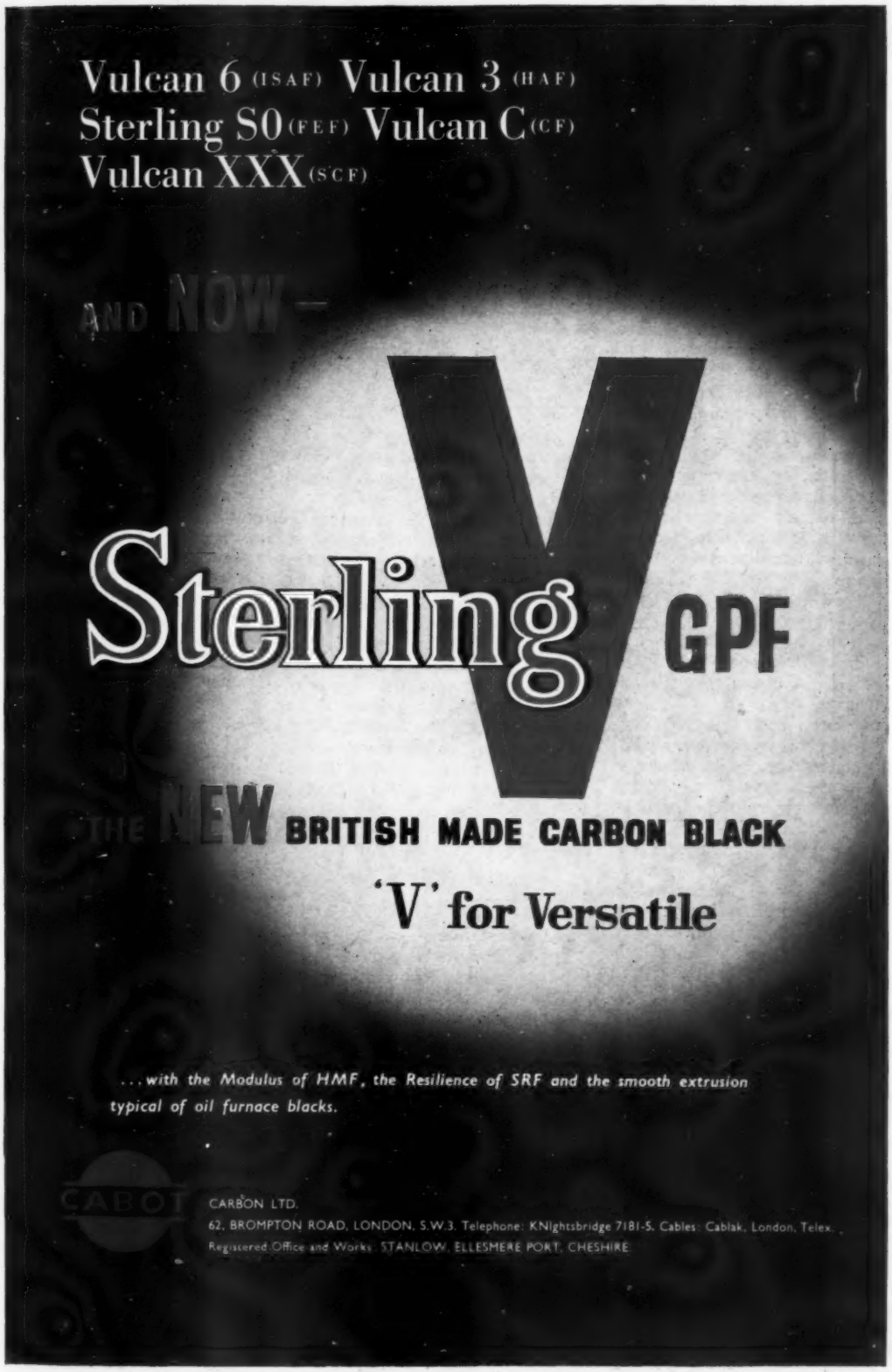
High molecular weight resins are generally used in calendered film. Sheeting applications require lower molecular weight resins. It was reported from Germany (1957) that calenders were being produced enabling vinyl film to be calendered 1 mil. thick and free of surface imperfections and pin holes.

For extrusion of shapes and profiles mainly high molecular weight suspension polymers are used. Thin unplasticized PVC sheet can also be used in packaging where the absence of any plasticizer that could leach out is of great importance.

(More questions next week)

Polly Ester Says . . .

'Urea is what you say when somebody arrives!'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MEN and MATTERS

A Review of People and Events

by George A. Greenwood

IN one way or another, Monsanto Chemicals has been much in the news during the past week or so. For one thing, as some readers will have seen, the group's trading surplus in the last financial year was up from £3,090,000 to £3,200,000. The reasonable assumption is that the enterprise is now feeling the beneficial results both from the opening of new plants and from consolidation, and it is fairly plain to see that plastics, together with some other departments of the chemical industry, play quite a part in this progress. I should hazard a guess that the cost of new plant, provision for depreciation, and payment of interest on the new capital raised, has proven a good deal heavier than was at first anticipated, so that net profit is actually down from £1,080,000 to £992,451 but still there is an unchanged dividend at 13½%. And that is all I am going to say about the purely financial set up, because I am frequently told it is none of my business to analyse balance sheets!

At any rate, there is some point in saying that this one, together with the report, gives a more than unusually clear view of chemicals and plastics at the present time. In the circumstances a lot of us might think that the interlocked trades are doing better than could have been expected, especially in view of the increasing and keener competition in the field of plastics, and the disabilities which are being experienced through lack of protection from foreign rivals, which the Tribunal, as we all know, failed to give them. When expanding plant, like that of Monsanto and other companies, is working to one hundred per cent capacity, and new equipment is brought into play, but especially if some sort of protection is vouchsafed to British producers, then the situation will probably be changed completely, if not almost revolutionized, and a very good time will be had by all.

Up To Date

In more ways than one, however, Monsanto is thoroughly up to date. Queries, and a ruling about luncheon vouchers in the Commons the other day, led one of the London evening newspapers to an investigation of their use, and the places where they are used, and the writer offered very high praise indeed to Monsanto for what the company does for its 550 odd staff at its Victoria Street building. The article said that there it runs a pleasant looking staff restaurant, which the workers refuse, understandably to call a canteen, 'with clean white table cloths, waitress service and an a la carte menu of great variety at incredibly low prices.'

Here, it seems, directors can be seen eating alongside typists — and when the menu includes items like fruit juice 4d.; poached egg florentine 1s.; lamb cutlet, 1s. 6d.; jacket potatoes, 3d.; and stewed rhubarb and custard 4d.—this is scarcely surprising.

Many people could be quite envious. I lunched as a guest at one of the most exclusive West-End clubs the other day, when there was an excellent menu and perfect service, but not more inviting was it than the Monsanto menu, and the cost was probably ten times the amount. Query; why, by the way, do clubs serve to us about three times as much as we can eat?

Invading the Stags

Let us now, for a moment turn to the lighter side. You will have read that on his world tour which has been covered for one of the great dailies by a brilliant journalist, Rhona Churchill, the Duke of Edinburgh last week reached Singapore, where 350 'merchant adventurers—Britons, Chinese, Indians, Malayans who between them control the world's rubber and tin and make a profit of £150,000 a year,' says Miss Churchill, had asked the Duke and the *paper* she represents to lunch. Miss Churchill turned up, as she herself says 'looking remarkably like a woman.' Meanwhile the eyes of 200 millionaires gazed upon her and the price of rubber rose two points before some of them recovered their power of speech. They had expected a male!

Miss Churchill proceeded to say that three of them ogled, two tried to date her and that she lost count of the number who told her that there would be trouble if their wives ever found out that she had been where she was. Anti-climax came when one millionaire took her aside, cleared his thoat, took a deep draught of Scotch and then a verbal plunge, saying 'I hope you don't mind too awfully, but this lunch is stag.'

Now I must let Miss Churchill proceed in her own way. She says: 'I was horrified, but managed to flutter my eyelashes, summon up my little-girl voice and say I didn't mind if he didn't.'

Her interrogator replied, 'that's fine,' and hastily and immediately summoned a little emergency general meeting, with Rhona as the sole item on the agenda. Meanwhile, and in such suspense, Rhona's eyes were fixed on the mountains of Oriental and European delicacies heaped on the long buffet tables, and her mouth watered. But it was all right in the end, for ultimately her millionaire friend came back beaming, took her by the arm, led her to the bar and handed her a king-sized whisky. Rhona was in! I will not make *your* mouth water with all the lovely food with which she was served, or my lady reader friends envious of the way in which the millionaires danced attendance upon her, hand and foot. It is the *denoument* that pays off. When Prince Philip saw her, he smiled warmly, and said in a loud voice 'Wow; someone *has* dropped a clanger!'

And so ends the story of the first woman who ever crashed into a sedate business men's sanctum in conservative Singapore.

Quite Personal

A year or so ago I drew attention to the fact that Mr W. H. McFadzean, C.A., C.I.E.E., Chairman and Managing Director of British Insulated Callenders Cables, and Chairman of Callenders (Submarine Cables), and Callenders Construction Co., had accepted the post of Industrial Leader and Vice-Chairman of the Advisory Council on Middle-East trade. I now hear that he is retiring, but only temporarily, from this post at his own request, largely through pressure of other work, and particularly because he has become President-elect of the Federation of British Industries. He does not by any means, mean it to

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be his severance from the Advisory Council, to which he hopes in the course of time to return. While Mr McFadzean is absent, Mr H. G. Nelson, Managing Director of the English Electric Co., has agreed to take over as Industrial Leader and Vice-Chairman of the Council, and will visit the Middle-East in his new capacity early in March.

Concerning Callenders, Telegraph Construction and Maintenance announce that Mr D. W. Aldridge and Mr W. C. Handley, directors of British Insulated Callenders Cables, have been appointed to the board, and that Mr W. F. Randall, managing director of the Telcon Metals Group, has been elected deputy chairman. Major H. Denison-Pender, Mr J. Innes, and Dr E. W. Smith, have retired from the board.

To fill the vacancy caused by the death of Mr C. S. Campbell, to which I referred at the time, Mr G. E. Buss, has been appointed to the Boards of the Mambau (FMS) Rubber Co., and Gadong (Perak) Rubber, and Mr. William Anderson has been appointed The Director of Taiping Rubber Plantations.

The Earl of Halsbury, who came into close touch with the rubber and chemical industries during the ten years in which he directed the activities of the National Research Development Corporation, for the launching of which he was responsible, is now retiring, and is next month to join the Board of Lancashire Dynamo Holdings, of which he will become Vice-Chairman. He has also accepted an invitation to join the Board of Joseph Lucas (Industries), on April 1. Lord Halsbury, a grandson of the famous Lord Halsbury who was Lord Chancellor of England, several times spoke at rubber trade gatherings, the last occasion I believe, being in 1958. He is a keen supporter of the campaign for increasing safety in industry.

There are changes in one of the important departments of I.C.I. Mr H. Smith, a Managing Director of the General Chemicals Division, has been appointed its Chairman, and Mr E. J. Callard, an I.C.I. Paints Division director, has been appointed Paints Division Chairman.

Annual Occasion

The London Rubber Company Ltd. held the second of their Annual Dances on February 20 at the Assembly Hall, Walthamstow, E.17, for staff employed at their Distributing Division. In addition to the 850 employees and their guests, executives and other members of the managerial staff, Mr A. R. Reid, managing director, was also present.

Dancing continued from 7.30 p.m. to 11 p.m. and the arrangements at this extremely successful occasion included an excellent cabaret and refreshments. Our picture shows

balloons showering down upon the hundreds of dancers — appropriately enough because London Rubber are among the largest, if not the largest manufacturers of balloons in the world.

Sir Walker Shepherd

With deep shock and great regret many people must have heard at the weekend of the sudden and tragic death in a train between Montreal and Halifax, of Sir Walker Shepherd, chairman of Turner and Newall, on his way home from a business trip. Sir Walker, who had been connected with this vast undertaking for over 30 years, and was associated also with its various subsidiaries and associated companies, was particularly well known in industry, in the city and in public and administrative life in the North, and he was greatly liked and much respected for his charm and integrity, which brought him a host of friends, not least in the rubber and plastic trades.

He first became connected with Turner and Newall's in 1927, when he was appointed secretary, but then his progress was so rapid that within seven years he became joint managing director, and within 15 years its vice-chairman. It is true that he had great driving force, which sprang from his tremendous capacity for work and his personality, and it was this which helped him to make the great contribution he did to the company over a period of 32 years, but he was also a kindly and a humane man, who understood human nature, and he did a great deal to promote and develop the admirable relationships which for many years had existed in the Turner and Newall organizations. Last year he was Master of the Worshipful Company of Needlemakers, with the Court of which he had been connected for many years and he had played quite a part in bringing the ancient City guild and the needle-making industry, centred at Redditch, into closer touch and understanding.

Sir Walker, who was 63, is survived by a widow, but no family.

Podnoddy's Theory

RABRM, at Shawbury, who were featured by Mulroy in his cartoon last week, have sent us a note which reads: ' The less hirsute members of the staff at Shawbury thank Mr Mulroy for his helpful suggestions.' The editor of *RJIP* says he expected a good ' wigging ' for using the cartoon, but I imagine that treatment would be better suited to Podnoddy.

Wage Demands

Difficulties are reported in negotiations between employers and employees of the rubber industry in the Hamburg area. After demands by the union for a wage increase of 7%, the employers offered 4%.

Mr D. W. Aldridge and Mr W. C. Handley have been appointed to the board of the Telegraph Construction and Maintenance Co. Mr W. F. Randall has been elected deputy chairman. Mr Aldridge and Mr Handley are directors of British Insulated Callender's Cables and Mr Randall is managing director of the Telcon Metals Group. Major H. Denison-Pender, Mr J. Innes and Dr E. W. Smith have retired from the board of the Telegraph Construction and Maintenance Co.

Sources of Raw Materials

PLASTICS INSTITUTE

AT a recent meeting of the London and District Section of the Plastics Institute, attended also by the Institution of the Rubber Industry, Dr A. W. C. Taylor, B.Sc., Ph.D., F.R.I.C., of Imperial Chemical Industries Ltd., gave a paper entitled 'Sources of Raw Materials for the Plastics Industry.'

In the early days of plastics, the quantities used were small and therefore the question of raw materials was of less importance. Since the war, the growth of the industry has been spectacular but dependent upon an abundant supply of raw materials. If the plastics industry was to go on expanding it was necessary that its products should be offered at such a price as to make possible the continued opening up of new markets. This in turn depended upon the availability of raw materials at a reasonable price.

In outlining the problem, Dr Taylor said that some idea of its magnitude could be seen in the figures for the growth of UK chemical production since the war. Among those illustrated (for the years 1948 and 1956 respectively) were those for total heavy organic chemicals, £83.4m. and £310m.—an increase of 270%; and for plastics, £27m. and £101m.—an increase of 275%. The plastics industry had, in fact, gone forward at a compound rate of growth of 17½%. Two questions arose in connection with the continuation of this growth rate: whether there were sufficient raw materials available to sustain it; and how the UK would fare in competition with other countries.

Dr Taylor went on to outline the more classical routes of organic chemicals from coal carbonization and from vegetable products; to mention the development of the acetylene consuming industry in Germany during the war; and to illustrate the normal oil refining operations; the cracking of distillate oil and the use of non-distillate fuel oils. The elegant chemistry of carbonylation, at 200 to 250 atmospheres, was also described. Dr Taylor commented that the old classical routes were disappearing to give way to elegant catalytical methods.

So far as benzene was concerned, there were adequate supplies for a long time. This was likewise true for acetylene and the carbide group. For the rest, we were in the petro-chemical era. New methods were making available a whole variety of raw materials, but Dr Taylor wondered whether, if atomic energy made widely available electricity at low prices, a return might then not be made to the older methods.

US Exports to Soviet Countries

The Commerce Department announced on February 25 the issuance of licences valued at 10,213,000 dollars to export US goods to USSR and Soviet bloc countries in the fourth quarter of 1958. That total was 2,726,000 dollars lower than the value of export licences issued in the third quarter of last year.

Major approvals to the bloc included methylene and polyvinyl chlorides, 317,464 dollars and styrene monomer, 13,600 dollars. Among the major items denied were synthetic rubber, 987,843 dollars and polythene, 277,782 dollars.

PIRELLI SALES CHANGES

A number of changes in the sales organization of Pirelli Ltd. have been announced. All the changes announced affect the Northern Division, which is controlled by the divisional sales manager, Mr A. B. M. Grant, from his office in Glasgow.

In the Glasgow district, under Mr B. G. Johnson district manager, Mr J. Gemmill now covers the Western half of the city of Glasgow, most of the County of Dumbarton and the County of Argyll. Mr J. D. G. Cruickshank is the representative for the counties of Angus, Perth and Clackmannan. Mr C. Moir now covers the counties of Kincardine, Aberdeen, Inverness, Banff, Moray, Nairn, Ross and Cromarty, Sutherland, Caithness and the islands of Orkney and Shetland. Mr J. M. Wilson is the area representative for the county of Lanark and Mr G. A. Sutherland for the south-western counties of Renfrew, Ayr, Wigtown, Kirkcudbright and Dumfries. Mr D. I. G. Neilson is the representative for the eastern half of the city of Glasgow, the county of Stirling and part of Dumbarton.

In the Newcastle district, under Mr H. Woodhouse, district manager, Mr N. A. Frost now covers the southern part of the County of Durham and the northern section of Yorkshire. Mr J. P. Wight now operates in the counties of Cumberland and Westmorland, West Northumberland and in the Furness Peninsula of Lancashire. The north Northumberland area is now covered by Mr D. Renwick.

H and C Appointment

Mr F. W. Harper has been appointed a director of Harrisons and Crosfield Ltd.

VIEWS AND REVIEWS

Continued from page 359

Amongst the conclusions reached in the Second Section, the following points may be noted:

'A thorough study of SKS-30A, SKB, and SKS-30AM and of raw compounds of these rubbers prepared at high mixing temperatures proved that, to obtain compounds and vulcanizates having the required properties, short mixing cycles are necessary.'

Mixings obtained by mixing for a short time at high temperatures 'and compounds prepared by standard methods are practically the same.' This applies to the raw compounds. It also applies in a comparison between vulcanizates prepared, respectively, by the two methods.

The oil-extended type SKS-30AM displays greater heat resistance than the other synthetic rubbers. 'Therefore, its use in industry with high-temperature, fast-mixing gives better results.'

Overall Conclusions

The overall conclusions (here slightly abbreviated) are:

a. The work confirms the expediency of using fast mixing methods for synthetic rubbers.

b. Future improvement 'may be obtained' by using one step loading, together with greater pressure and faster rotor speed.

c. The author recommends 'the wide introduction, in production, of the two stage mixing process with increased rotor speed in the first stage.'

d. (The above recommendations) 'In a factory producing two million tyres a year, this decreases the investment by 7.5 million roubles and cuts operating expenses by two million roubles per year.'

PHILIP SCHIDROWITZ

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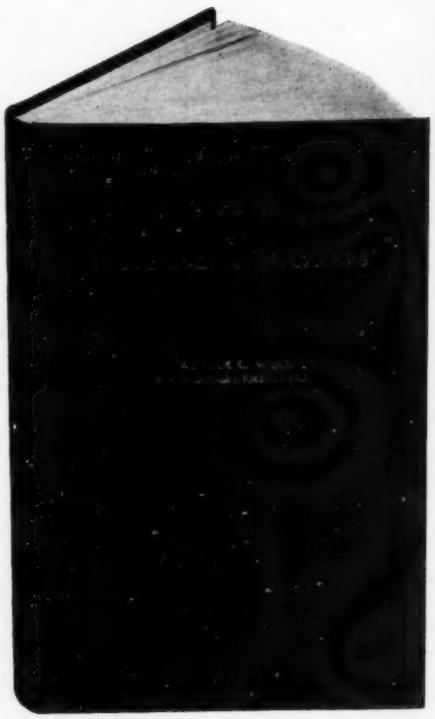
This invaluable book has been written from the experience gained by the author in his work with the Research Association of British Rubber Manufacturers, from his association with the B.S.I. committee dealing with chemical analysis of rubber and Committee RUC/10/5, of which he is chairman.

It will unquestionably become a standard work and is a 'must' for all analysts interested in this subject.



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BPF Specification

MOULD FIXING CENTRES

A SPECIFICATION for mould fixing centres on injection moulding machines has been drawn up by the manufacturers of injection moulding machines in the engineers' group of the British Plastics Federation, with the co-operation of the injection moulders.

The object of the Specification is to ensure interchangeability of moulds between injection moulding machines made by different manufacturers. To this end the specification establishes the positions and sizes for a minimum number of bolt holes in the mould die plates on machines of various sizes.

The machine manufacturers remain free to provide additional fixing holes to suit their own designs to ensure more freedom of action for the moulder in fitting moulds to his machines, but they have agreed always to provide the fixing holes shown in this specification. These should be sufficient to ensure interchangeability of moulds between one machine and another in normal circumstances. A minimum size of spigot hole for mould location in the stationary die tables will also come within the scope of the specification.

In preparing this specification care has been taken to ensure as far as possible that its adoption will not in any way hinder design development of injection moulding machines.

The manufacturers who have undertaken to conform to this specification are: Cravens Ltd. (for Wickman Ltd.), T. H. and J. Daniels Ltd., Fawcett Preston and Co. Ltd., Alfred Herbert Ltd., The Projectile and Engineering Co. Ltd., Francis Shaw and Co. Ltd., and R. H. Windsor Ltd.

Additional Specifications

The following draft specifications have been passed to the British Standards Institution for consideration by their committees:

1. Toughened polystyrene sheet.
2. Rigid PVC extrusion and injection moulding compounds.
3. Finish-treated glass fabrics and chopped strand mat.
4. Revision of BS 771—Synthetic Resin (Phenolic) Moulding Materials.
5. Low density polythene moulding and extrusion materials.

A glossary of terms used in vacuum forming has also been submitted to BSI.

Indian Nationalization

Mr E. M. S. Namboodripad, the Chief Minister of Kerala, said in the State Legislature on February 23 that his Government's view was that the nationalization of plantations in the State was necessary for the economic development of the State, but that the attitude of the Indian Government was not favourable.

Asked whether the State Government had officially approached the Central Government in this matter, he said that during certain informal discussions Central Government ministers had advised him not to proceed with the scheme at present. He felt it was better to accept that advice under the present situation. Replying to another question, he said his Government would like to nationalize the plantations without paying compensation if it were possible.

DESIGN DISPLAY

A collection of over two hundred of the world's finest plastics products for the home will be one of many special features of the International Plastics Exhibition at Olympia, London, June 17-27. This Design Display, sponsored by *British Plastics*, organizers of the Exhibition, and arranged in conjunction with the Design Committee of the Plastics Institute, will contain the work of leading industrial designers in Austria, Canada, Denmark, Finland, France, Holland, Italy, Sweden, Switzerland, the United States, the United Kingdom and Western Germany. A prize of 100 guineas will be awarded to the designer of the product considered to be the best in the Design Display.

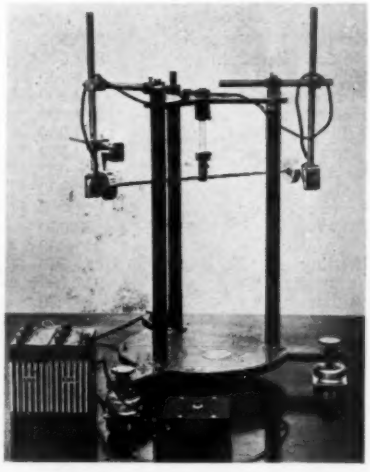
Judging for the award will be carried out at the exhibition by a panel of three international design authorities: Dr Ernesto Rogers, from Italy; Mr Robin Day, one of Britain's best-known designers; and Count Bernadotte of Denmark.

Mr William Fraser, of Scottish Cables, has been elected chairman of the Scottish Council of the Federation of British Industries in succession to Mr Colin Mackenzie, of J. and P. Coats.

'Torsion Pendulum'

The Electronics and Instrumentation Division of the Baldwin-Lima-Hamilton Corporation in the US has recently developed an entirely new type of 'Torsion Pendulum' for materials testing.

The new instrument is designed primarily for determining the crystallinity of articles fabricated from 'Teflon' TFE-Flourocarbon resins, and was developed in conjunction with the Du Pont Company. 'Torsion Pendulum' is claimed to be the first commercial instrument of its kind made specifically for its purpose.



The basic instrument consists of a solid, 3-post frame with provision for accurate levelling. The pendulum itself, consisting of the specimen and a weighed torsion arm assembly, is suspended from the frame. Two adjustable electromagnets, energized by means of a push-button control, initiate oscillation of the pendulum.

Determination of the torsion modulus (which permits calculation of the crystalline level of the specimen) is accomplished by determining the period of oscillation of the pendulum. This may be done by observing an index line on one of the pendulum weights as it passes a stationary pointer, or by reflecting a collimated light beam from a mirror mounted on the pendulum to a separate optical scale.

Both light source and scale are accessory equipment.

Rubber Statistics

BRAZIL — ITALY — GERMANY — VIETNAM — MALAYA

THE latest figures supplied by the Brazilian Comissao Executiva de Defesa da Borracha bring the published information up to the end of August.

During the month of August local production of rubber amounted to 1,251 tons of crude natural and 86 tons of natural latex, while 1,950 tons of rubber were imported and 768 tons reclaimed. Consumption during the month totalled 3,377 tons of crude natural and 110 tons of natural latex, while in addition 121 tons of synthetic rubber and 55 tons of synthetic latex were also consumed.

These totals brought Brazilian production for the eight months to the end of August to 14,795 tons of crude natural and 694 tons of natural latex, while imports amounted to 12,189 tons of crude and 245 tons of latex, and in addition 1,071 tons of synthetic rubber. Consumption for these months totalled 29,517 tons of crude natural, 745 tons of natural latex and 1,219 tons of synthetic. Stocks on hand at the end of August stood at 5,309 tons of crude natural, 229 tons of natural latex, and 648 tons of synthetic; in the case of crude natural, this represented a reduction of some 1,500 tons compared with the position at the beginning of the year.

During these eight months 5,637 tons of rubber were reclaimed, and 5,745 tons of reclaim were consumed. Stocks on hand at the end of August stood at 525 tons, compared with the 577 tons which had been held at the beginning of the year.

Western Germany

According to provisional figures issued in Frankfurt, the December production of tyres in Western Germany amounted to 15,346 tons compared with the November total of 15,668 tons, and the December 1957 total of 11,947 tons. This brought production for the whole year to 166,461 tons, a slight increase on the previous year's total of 162,862 tons.

There was a similar slight increase in the production total for other rubber products, from 207,843 tons in 1957 to 216,085 tons in 1958, the December output having amounted to 16,504 tons compared with the previous month's figure of 18,169 tons.

Imports of synthetic rubber up to the end of November totalled 37,237 tons, of which 30,906 tons came from the US and 5,522 tons from Canada. Imports of natural rubber during the same period amounted to 110,970 tons, of which 52,864 tons came from Malaya and 25,786 tons from Indonesia.

Italy

The following provisional data, expressed in metric tons, have been published by the Secretariat of the International Rubber Study Group and relate to the first three-quarters of 1958.

During this period 35,157 tons of natural rubber, 15,498 tons of synthetic rubber and 5,067 tons of reclaimed rubber were consumed.

The natural rubber included 6,629 tons of latex, 18,133 tons of smoked sheets, 286 tons of sole crepe and 10,109 tons of other grades. Of the total amount, 20,636 tons were used for tyres and tubes, 11,117 tons for technical and other articles, 1,379 tons for footwear, 935 tons for soles, heels and sheeting, and 1,090 tons for cables.

The synthetic rubber consumed consisted of 636 tons of synthetic latices, 10,635 tons of dry S-type rubber, 1,336 tons of neoprene, 2,261 tons of butyl and 630 tons of N-type rubber. Tyres and tubes accounted for 11,178 tons of this total, while technical and other articles took 2,689 tons.

Vietnam

The French Rubber Growers have now issued details of the planted acreage of rubber in Vietnam. At the end of 1957 the total acreage of estates, which are defined as being over 500 hectares or about 1,250 acres in extent, was 155,511 acres. Of this area, some 65,000 acres are known to have been planted prior to 1930, a further 30,000 acres in the period 1930-1935 and just over 42,000 acres between 1936 and 1945. A further 13,500 tons only are known to have been planted since the war.

Sole Crepe Exports

The Rubber Study Group states that sole crepe exports from Malaya during November totalled 761 tons, compared with the October total of 673 tons, bringing the tonnage exported from Malaya since the beginning of the year to 8,700 tons compared with the comparable 1957 total of 16,065 tons. The UK took 467 tons of the November exports, and other countries to take appreciable quantities included Poland (65 tons), Hongkong (42 tons), and France (35 tons).

Sole crepe exports from Ceylon amounted to 49 tons in October and 49 tons in November, bringing the total for the year to the end of November to 956 tons, compared with exports of 2,388 tons during the first eleven months of 1957.

Rubber Crop Returns

HARRISONS AND CROSFIELD LTD.

	January 1959 lb.		No. of mths. of fin. year to date	Fin. year to date lb.	
Sumatra					
Allied Sumatra	877,651	(934,750)	1	877,651	(934,750)
Asahan	125,662	(145,504)	6	749,564	(853,180)
Bah Lias	171,959	(209,437)	3	513,672	(679,017)
Central Sumatra	97,002	(112,434)	7	655,868	(751,768)
Lankat Rubber	65,036	(68,343)	10	627,650	(625,004)
Mendaris	216,051	(214,516)	1	216,051	(214,516)
Namoe Tongan	277,780	(291,007)	5	1,373,466	(1,352,522)
Sialang	246,915	(224,950)	12	2,365,976	(2,390,365)
Soengei Rampah	57,320	(63,934)	1	57,320	(63,934)
Tanah Datar	81,570	(84,877)	1	81,570	(84,877)
Tandjong	171,959	(151,648)	7	1,073,578	(1,033,597)
Toerangie	224,869	(246,915)	3	670,198	(701,063)
United Lankat	31,746	(31,967)	1	31,746	(31,967)
United Serdang	908,515	(1,105,828)	5	4,901,046	(5,464,983)
Malaya and Borneo					
Castlefield	269,500	(245,500)	7	1,680,000	(1,505,000)
Golden Hope	803,800*	(698,400)	11	7,272,000*	(6,896,100)
Holyrood	81,000	(71,500)	1	81,000	(71,500)
Hongkong	29,200	(20,800)	1	29,200	(20,800)
Hoscote	279,400	(249,000)	7	1,743,900	(1,697,400)
Killinghall	49,000	(38,500)	7	306,100	(258,300)
Kuala Selangor	60,000	(52,000)	1	60,000	(52,000)
Kulai	216,000	(159,000)	3	627,000	(452,000)
Lanadron	455,000	(401,600)	1	455,000	(401,600)
London Asiatic	1,670,000	(1,451,000)	1	1,670,000	(1,451,000)
Malaysia	58,000	(77,000)	1	58,000	(77,000)
New Crocodile	265,000	(267,000)	11	2,649,000	(2,302,000)
Pataling	1,251,500	(1,049,500)	3	3,775,000	(3,063,500)
Prang Besar	247,100†	(185,900)	10	1,902,200†	(1,623,400)
Sandac	90,000	(82,000)	10	755,000	(728,000)
Sapong	145,000	(155,000)	1	145,000	(155,000)
Seaport	90,000	(92,000)	7	565,000	(568,000)
Strathisla	124,000	(95,000)	7	775,000	(640,000)
South India and Ceylon					
Malayalam	766,100	(757,600)	10	6,698,700	(6,565,500)
Lunuva	133,572	(144,658)	1	133,572	(144,658)

* Includes Klanang Bahru Estate crop from January 1 1959

† Includes Bukit Prang Estate crop from January 1 1959

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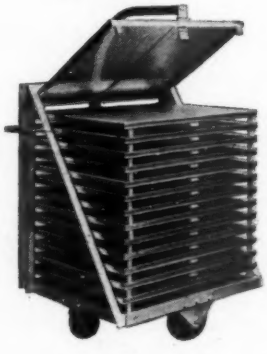


COMPANY MEETING

The Rubber Trade Association of London

NATURAL RUBBER STILL EXCEEDS SYNTHETIC IN PRICE

Mr J. W. A. Calver's Address

THE annual general meeting of The Rubber Trade Association of London was held on February 27 at the Rubber Growers' Association, 19 Fenchurch Street, London, E.C.

Mr J. W. A. Calver, the chairman, in the course of his speech, said: There is always something interesting about natural rubber and this year it is of great interest that, although there is considerable excess capacity for the production of synthetic rubber, nevertheless the demand for natural rubber continues to maintain the price at a substantially higher level than that of synthetic; indeed it is quite possible there will be a considerable shortage before the end of the year with an even greater price disparity.

It looks as if there must be a very big drive to increase consumption of synthetic rubber over the next few years and it can be presumed that manufacturers will tend to use more at the expense of natural rubber consumption if technical problems can be overcome.

Natural Rubber's Handicaps

Natural rubber in competition with synthetic has certain handicaps. One is that in the past, although hardly recently, it has been subject to considerable price movements. Secondly, whereas the manufacturer is always assured of getting the quality of synthetic which he buys this is not sufficiently so as regards purchases of natural rubber in certain markets. On the other hand natural rubber is a better and potentially cheaper material to produce than synthetic, and is more or less indispensable for many purposes so that users will not readily change to synthetic for these purposes. It is generally understood that this more or less basic demand is, at current levels of activity, about equivalent to today's production of natural. If business activity increases generally the demand could be for more than the amount of natural currently available.

In this connexion a major factor conditioning the natural rubber market is the very substantial demand for natural rubber from the Soviet Bloc and China. The increase in their consumption in 1958 as compared with 1957 is evidenced by the figures already quoted and we must expect that they will continue to be a major buyer. We have to take into account also that, because of the greater activity of the present users of natural rubber, there may be a substantial increase in natural rubber consumption for 1959 in the USA as compared with 1958.

This brings me back to the first disadvantage I have mentioned, that the price of natural rubber can be subject to considerable fluctuation, a matter which the governments of producing countries have been considering for some time. There have been various suggestions for stabilization schemes, none of which so far has been shown to have more advantages than disadvantages, and indeed the Malayan Government published last year an admirable paper which it had prepared for the International Rubber Study Group meeting which set out all the factors and drew the conclusion that an acceptable scheme was not yet in sight. There is no doubt in my mind that the balance of advantage lies with allowing the normal price mechanism of the open market to operate, and that attempts to control closely the price of world commodities have invariably either failed or done more harm than good. But this must not blind us to a sympathetic understanding of the impatience of producing country governments over their difficulty in confident budgeting when their income depends to such a great extent on the price level of one or two commodities whose value varies very greatly from year to year.

However, there seems little likelihood of a material fall in the price of rubber for some time ahead so that there is no evident occasion for producing country governments to contemplate price control schemes for the time being especially since it is quite unthinkable that either the US Government or UK Government stockpiles would be used to the prejudice of the economies of the producing countries. We in London must regret that much greater use is not made of our futures market as we are convinced that its greater use would help materially to level out fluctuations. It cannot, of course, influence long-term trends which may be brought about by serious under-production or under-consumption.

Steady Increase in Malayan Production

On the supply side a most interesting factor, which is becoming manifest, is the steady increase in Malayan estate rubber output. The December output, helped by exceptional weather, was 41,547 tons, compared with 31,849 tons in November, and the January production of estate rubber was 37,568 tons. With post-war replantings coming into bearing somewhat rapidly a relatively sharp increase in production is to be expected, and by 1965 Malayan estate output should be well over 500,000 tons as compared with 390,000 tons for 1958.

Although a substantial degree of replanting has been done in Ceylon since the war, the climate for plantation activity has been discouraging and the contribution by Ceylon to new rubber production has been proportionately less than in Malaya where the scale of replanting and new planting has been magnificent in spite of the Emergency. Similarly in Indonesia the conditions which could have resulted in a big surge forward in rubber production have been absent, and it may well be that the additional rubber which Indonesia could have supplied will be sadly missed in the next few years. In the long run it is only the new areas and replanted areas of high yielding rubber which can count on being competitive with synthetic rubber and plastics, and it is probably fortunate that new planting is being done in Africa, South and Central America and China, as there is reason to suppose the world will require all the natural rubber which is likely to be produced for as far ahead as we can see.

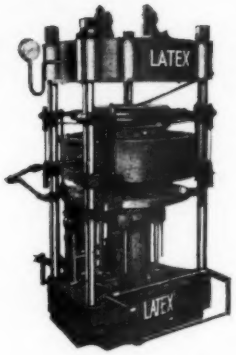
Taxation

Having said how satisfactory Malaya is from the point of view of production, there is another point I would like to mention and that is taxation. Formerly Malaya was considered a low tax area, and it is generally conceded that political stability plus low taxation breed prosperity. Malaya has political stability and is at present prosperous, so it is difficult to understand why it was decided to increase taxation from 30% to 40% last December. But this isn't the end of the story. In addition to direct taxation there is an export duty and these combine to make the Malayan Government's share of rubber producers' profits equal to approximately 60%. This taxation is excessive by any standards, and with the even greater handicaps producers experience in Ceylon and Indonesia, must tend to discourage rubber plantation companies from venturing new capital in the East.

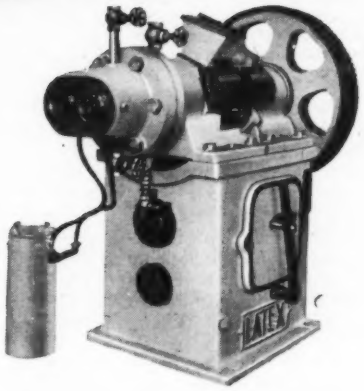
Latex producers have had an uncomfortable year although the 1958 consumption at 167,500 tons was 5,000 tons greater than consumption in 1957. This increase in demand was, however, not as great as had been anticipated by producers and as a result some cutbacks in production had to be effected, if only because of sheer lack of storage space. Latex is meeting ever-increasing competition from synthetic substitutes and if it is to hold its position, producers will have to ensure that sufficient, regular supplies are forthcoming at competitive prices.

The decision of the Government in January to bring about a very substantial measure of convertibility of sterling is welcomed by us all. Since the war the London rubber market has suffered through having, as it were, its hands tied in a way which was not so evident elsewhere, and much business has gone to countries where operators were able to take advantage of cheap rates of sterling or other facilities which were not available here. The restoration of the convertibility of sterling removes this handicap and should be reflected in a return to this market of business which it has lost through circumstances outside its control.

Latex Engineering Co



Cycle Tyre Press



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PATENT SPECIFICATIONS

The following information is prepared from published Patent Specifications. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 3s. 6d. per copy (including postage).

Injection Moulding Machines

No. 803,815. R. H. Windsor Ltd. and R. H. Dykehouse. Application, March 17 1955. Filed, February 28 1956. Published, November 5 1958.

The invention is for an improved injection moulding machine incorporating an improved pre-plasticizing unit. Fig. 1 is a vertical part-section through the machine and Fig. 2 is a vertical section of the pre-plasticizing unit.

As shown in the drawings, the machine comprises an hydraulically-operated device A of any known form having a reciprocating piston for feeding powder or granular thermoplastic material into a pre-plasticizing unit, a pre-plasticizing unit B for bringing the powder into a suitable plastic condition prior to it being ejected into an injection cylinder and an injection cylinder C from which the plasticized material is injected into a mould for moulding the final product. The powder or granular material is contained in a feed hopper 11 and is fed to the machine through the inlet 9.

The pre-plasticizing unit comprises a housing 12 through which a feed conduit in the form of a tube 13 for the thermoplastic material passes serpentine fashion from the inlet end (connected at the top of the housing with a feed cylinder 5) to the outlet end, connected at the bottom of the housing by a nozzle 14 with the interior of the injection cylinder C. The inlet end 13a of the feed tube 13 is cylindrical but from the point 13b to the outlet end is flattened as shown at 13c (Fig. 2).

Extending transversely into the pre-plasticizer housing 12 at right angles to the axis of the feed tube 13 are a plurality of tubes 15 in which electric resistance heating elements are mounted. These heating tubes 15 are disposed closely adjacent to the walls of the feed tube 13 throughout its length. Within the lower end of the pre-plasticizer housing 12, and extending completely through it, is a cylindrical sleeve 16 which forms part of the injection cylinder C. After the feed tube 13, the heater element tubes 15 and the cylinder sleeve 16 have been arranged in the pre-plasticizer housing 12, the housing is filled with a mass of high-heat-conducting material which may be a fluid or a molten metal, for example aluminium, which subsequently solidifies so that the serpentine feed tube 13, the heater element tubes 15 and the cylindrical sleeve 16 are completely surrounded or embedded in the material.

The injection cylinder indicated generally at C includes an inner cylinder 17 fitted within the cylindrical sleeve 16 and retained in position by a retaining ring 18 at one end and an injection nozzle head 19 at the other end. The cylinder 17 is provided with an external annular groove 17a into which opens the nozzle 14 of the serpentine tube 13. The bottom of this annular groove 17a is formed in the wall of the injection cylinder and communicates with the interior of the cylinder 17 through a plurality of apertures 17b spaced circumferentially around the cylinder. In this manner the plasticized material is fed evenly into the cylinder. Slidably mounted within the cylinder 17 is a piston 26 which is coupled at its outer end, by means of a coupling 27, to any suitable known type of hydraulic power unit adapted to move the piston backwards and forwards intermittently within the cylinder 17, at suitably timed intervals. Intermediate the ends of the piston 26 is a metering device for varying the stroke of the piston, whereby the quantity of material injected into the mould through the nozzle 22 during each stroke of the piston can be adjusted according to requirements.

In operation of the machine, powder or granular thermoplastic material is fed by gravity from the hopper 11 into the feed cylinder 5 from where it is forced under pressure, by the reciprocating piston 6, into the serpentine tube 13 of the pre-plasticizer unit. As the material passes through the serpentine tube 13 it is heated by the heating elements 15 and thereby plasticized, and is subsequently fed through nozzle 14 in the required plastic condition into the injection cylinder 17 through the annular groove 17a and apertures 17b. The piston 26 then operates to force the plastic material through the nozzle 22 into the mould (not shown) to produce the finished article.

The injection moulding machine according to the invention has the great advantage over known constructions that the pre-plasticizer unit can be

Continued on page 374

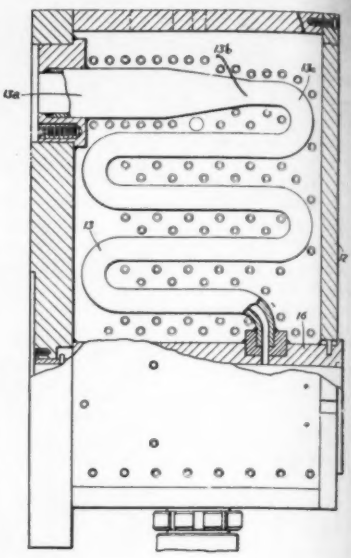
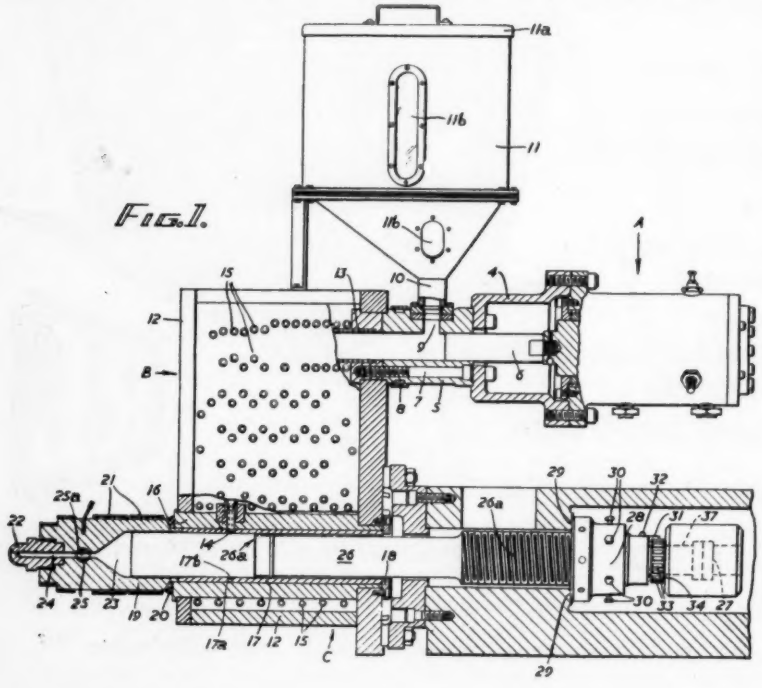


FIG. 2.

FIG. 1.



Synthetic Rubber Prices

Prices of synthetic rubbers appear regularly in RUBBER JOURNAL AND INTERNATIONAL PLASTICS *in the first week of each month. It will be appreciated if suppliers will give notification of any price changes or additions to their range. Cif duty paid quotations are subject to slight variation due to exchange, ocean freight and insurance fluctuations. Prices are in pence per lb., except where otherwise stated.*

(e-qdp)—Ex-quay duty paid (cifUKdp)—cif UK duty paid (ddp)—Delivered duty paid (e-sUK)—Ex-store UK (ex-wUK)—Ex-warehouse UK (d)—Delivered

SBR TYPES AND HIGH-STYRENE RUBBER

Ameripol (Goodrich Gulf) (min., 70,000-lb. lots)	(e-qdp)
1000 Hot, Non-Oil	23.10
1001 " "	23.10
1002 " "	23.34
1006 " "	23.34
1007 " "	23.34
1009 " "	23.71
1011 " "	23.71
1012 " "	23.24
1013 " "	23.94
1500 Cold, Non-Oil	23.10
1501 " "	23.10
1502 " "	23.10
1703 Cold, Oil-Extended, 25% oil	*20.31
1705 " " " "	*20.07
1707 " " 37.5% oil	*18.89
1708 " " " "	*18.89
1710 " " " "	*18.66
1712 " " " "	*18.66

* Under 70,000 lb., min. 600 lb.

ASRC (American Synthetic Rubber Corpn.) (carloads lots of 30,000 lb.)	(cifUKdp*)
1000 Hot, Non-Oil	23.99
1001 " "	23.99
1004 " "	23.99
1006 " "	23.99
1009 " "	24.61
1018 " "	26.74
1019 " "	26.26
1500 Cold, Non-Oil	23.99
1502 " "	23.99
1503 " "	26.02
3110 " "	25.78
1703 Cold, Oil-Extended	20.69
1708 " "	19.27

* US/£ conversion rate $2.80

Cariflex (Shell Chemical Company)	(e-sUK)
S-1000 Hot	22.0
S-1002 "	23.375
S-1006 "	22.0
S-1009 "	24.0
S-1011 "	24.0
S-1013 "	24.0
S-1100 Hot/black	19.75
S-1500 Cold	22.0
S-1502 "	22.0
S-1600 Cold/black	19.625
S-1602 " "	19.625
S-1605 " "	19.375
S-1703 Cold, Oil-Extended	20.25
S-1706 " "	20.0
S-1707 " "	17.75
S-1709 " "	17.5
S-1712 " "	17.5
S-1803 Cold, Oil/Black Masterbatch	17.875
S-1804 Cold, Oil/Black Masterbatch	19.25

Copo (Copolymer)	(cifUKdp)
1006 Hot, Non-Oil	23.25
1500 Cold, "	23.25
1502 " "	23.25
1505 " "	26.00
1712 " Oil-Extended	18.50
1778 " "	18.75
3900 " Rosin-Extended	23.125

FR-S (Firestone)	(cifUKdp)*
1000 Hot	23.187
1001 "	23.187
1004 "	23.187
1006 "	23.187
1500 Cold	23.187
1502 "	23.187
146 "	23.187
1703 Oil-Extended	20.125
1712 "	18.5
123 "	19.187
155 "	18.5
173 "	20.125
178 "	18.75
1009 Specialty	24.625
1010 "	25.812
1012 "	24.187
1013 "	24.875
1014 "	27.75
1015 "	28.75
141 "	28.625
158 "	29.562

*US/£ conversion rate $2.80

International Synthetic Rubber Co.	(ex-wks)
Intol 1500	22
Intol 1502	22
Intol 1710	17.5
Intol 1712	17.5

Philprene (Phillips)	(e-qdp*)
1000 Hot, Non-Pigmented	23.28
1001 " "	23.28
1006 " "	23.28
1009 " "	24.69
1010 " "	25.86
1018 " "	26.80
1019 Hot, Non-Pigmented	26.33
1100 Hot, Pigmented	19.65
1104 " "	19.28
1500 Cold, Non-Pigmented	23.28
1502 " "	23.28
1503 " "	26.10
1601 Cold, Pigmented	19.56
1605 " "	19.28
1703 Cold, Oil-Extended	20.23
1706 " "	19.94
1708 " "	18.82
1712 " "	18.58
1803 " Pigmntd, Oil-Extended	17.78
1805 " "	15.99

*US/£ conversion rate $2.81½

Plioflex (Goodyear)	(fasUSport US Cents per lb.)
1006 Hot, Non-Pigmented	23.25
1500 Cold, Non-Pigmented	23.25
1502 " "	23.25
1703 Cold, Oil-Extended	20.00
1710 " "	18.25
1712 " "	18.25
1713 " "	16.9
1714 " "	16.65
1773 Cold, Oil-Extended, Light-Coloured	20.00
1778 Cold, Oil-Extended, Light-Coloured	18.5

Polysar (Polymer UK)	(e-sUK)
S Hot	22
S630 "	22
Kryflex 200 Cold, for Cables	23.5
Krylene "	22
Krylene NS " Non-Staining	22
Krynol 651 " Oil-Extended	17.5
Krynol 652 " "	17.75
SX 371 Process Aid	24

Synpol (Texas-U.S. Chemical Company)	(cifUKdp)
1000 Hot, Non-Oil	23.10
1001 " "	23.10
1002 " "	23.34
1006 " "	23.10
1007 Hot, Non-Oil	23.10
1009 " "	23.71
1012 " "	23.24
1013 " "	23.94
1061 " "	23.10
1500 Cold, Non-Oil	23.10
1502 " "	23.10
1551 " "	23.10
1703 Cold, Oil-Extended	20.13
1707 " "	18.71
1708 " "	18.71
1711 " "	19.18
1712 " "	18.48
8200 " "	18.71
8201 " " (50 parts oil)	17.20
8150 Cold, Non-Oil, Black Masterbatch	19.46
8250 Cold, Oil-Extended, Black Masterbatch	17.67
8251 Cold, Oil-Extended, Black Masterbatch	16.11
8253 Cold, Oil-Extended (non-staining) Black Masterbatch	16.20

US/£ conversion rate $2.80

SBR LATICES

Copo (Copolymer) (10-ton lots)	(cifUKdp)
2101 (dry weight)	46.30
X-765 (" ")	40.80
X-800 (" ")	37.20
2102 (" ")	38.00
2105 (" ")	38.00
2110 (" ")	38.00

Naugatex (Naugatuck Chemical International)	(ex-wUK)
2000	39
2001	39
2002	39.5
2006	43
2105	40
2107	40
2108	40
2711	39
2714	39
2733	39
2740	43

Pliolite Rubber (Goodyear)	(d)
2000	40

Latex	
2001 (dry weight)	40
2104 " "	40
2105 " "	40
2108 " "	40
5350 " "	40

Pliolite Resin (Goodyear)	(d)
101A (dry weight)	44
150 (" ")	50
151 (" ")	35
160 (" ")	50
170 (" ")	50

Hycar (B. F. Goodrich)	(ddp)
2507 (high styrene) dry weight	48

Polysar (Polymer UK)	(e-sUK)
Latex, type II	38.5
Latex, type IV	32.5
Latex, type 721	33.5

International Synthetic Rubber Co.	(ex-wks)
Intol Latex R23	22
Intol Latex M23	22

ACRYLONITRILE TYPES

Butaprene N (Firestone)	(cifUKdp)
NL	52.5
NAA	56.25
NF	51.5
NXM	60.18

Chemigum	(e-s)
N—1	75
N—3A	52
N—5	52
N—6G	45
N—7	45
N—8	45
N600X	45

Hycar (British Geon) (500-lb. lots and over)	(UKd)
1001 High Nitrile Hot	52
1041 „ „ Cold	52
1002 Medium High Nitrile Hot	45
1042 „ „ „ Cold	45

Hycar (B. F. Goodrich) (500-lb. lots and over)	(ddp)
1411 High Nitrile (powder)	66
1432 Medium High Nitrile (crumb)	64
1072 Medium High Nitrile (carboxyl)	66
1312 Medium High Nitrile (liquid)	55
1043 Medium Low Nitrile	51
1014 Low Nitrile	61

I.C.I. (min. 5-cwt. lots)	(UKd)
Butakon A-4051 High Nitrile Cold	52
Butakon A-3051 Medium Nitrile High Mooney Cold	45
Butakon A-3002 Medium Nitrile Low Mooney Cold	45

Paracril (US Rubber)	(e-sUK)
18-80 Low Nitrile	63
AJ „ „	50
B Medium Low Nitrile	51
BJ „ „ „	51
BLT „ „ „ Cold	51
BJLT „ „ „ „	51
C Medium High Nitrile	59
CLT „ „ „ Cold	59
CV „ „ „(crumb)	60
D High Nitrile	67
ALT	51

Polysar (Polymer UK)	(d)
Krynac 800 Medium Nitrile	45
Krynac 802 Low „	45
Krynac 803 Medium „ (low Mooney)	45
Krynac 801 High Nitrile	52

ACRYLONITRILE LATICES

Butaprene N (Firestone)	(cifUKdp)
N-300 (dry weight)	53
N-400 („ „)	60.5

Chemigum Latex (Goodyear)	(d)
200 (dry weight)	65
235 CHS („ „)	60
236 („ „)	60
245 B („ „)	52
245 CHS („ „)	52
246 („ „)	52
247 („ „)	52
248 („ „)	52

Hycar (B. F. Goodrich) (dry weight, 3 drums and over)	(ddp)
1551 High Nitrile (large particle)	66
1552 Medium High Nitrile (large particle)	57

Hycar (British Geon) (dry weight, 3 drums and over)	(UKd)
1561 High Nitrile	60
1571 „ „ (carboxyl)	60
1562 Medium High Nitrile	52
1577 „ „ „ (modified)	

ACRYLIC TYPES

Hycar (B. F. Goodrich)	(ddp)
4021 Slab, 500 lb. and over	144
4501 Latex, dry weight	96

BUTYL TYPES

Esso	(e-sUK)
Regular 035	21.75
Regular 150	21.75
Regular 215	21.75
Regular 217	21.75
Regular 218	21.75
Regular 325	21.75
Non-staining 065	22.75
Non-staining 165	22.75
Non-staining 265	22.75
Non-staining 267	22.75
Non-staining 268	22.75
Non-staining 365	22.75

Vistanex (Polyisobutylene)	(e-qdp)
MS Low molecular weight	54
MH „ „ „	54
L-80 Medium molecular weight	54
L-100 „ „ „	54
L-120 „ „ „	54
L-140 „ „ „	54

Polysar (Polymer UK)	(e-sUK)
Butyl 100	21.75
Butyl 200	21.75
Butyl 300	21.75
Butyl 301 (non-staining)	21.75
Butyl 400	21.75
Butyl 101 (non-staining)	26.25

Hycar (B. F. Goodrich) (500 lb. and over)	(ddp)
2202 Brominated	68

NEOPRENES

	(e-qdp)
W and WHV (dry weight del)	42.62
WRT („ „ „)	48.37
WX („ „ „)	44.62
GN („ „ „)	44.62
GNA („ „ „)	44.62
GRT and S („ „ „)	45.62
AC („ „ „)	57.125
KNR („ „ „)	75.62
AC'M' and 'S' „ „ „)	57.125
CG („ „ „)	57.125
AD („ „ „)	57.125

Latices—Dry (per lb. del, min. 50 lb.)	
571	49.75
842A	49.75
572	51.25
601A	51.87
650	54.125
735	51.25
736	51.25
950	58.25
60	51.87
750	51.25
635	53.62

SILASTOMER

Midland Silicones (500 lb. lots del)	
Stocks	16s. 6d. to 35s.
Pastes	26s. to 35s.
Gums and base stock	36s. to 42s.
Cold-curing silicone rubber	20s. and 23s. 6d.

REINFORCING RESINS AND RUBBERS

I.C.I. (min. 2-ton lots)	(UKd)
Butakon S-8551	36.5
Butakon S-7001	33.5

Hycar (B. F. Goodrich)	(ddp)
2007 (powder)	42.5

Pliolite (Goodyear)	(d)
S—6B	36.5

Polysar (Polymer UK)	(e-sUK)
SS-250 (high styrene) (bale form)	27.25
SS-250 („ „) (flake form)	27.5
Kryflex 252 (high styrene)	25.5

Cyclite (Durham Raw Materials)	42

HYPALON

In 50-lb. bags del UK	71.62

'Electronics—the Key to Automation' will be the theme of the Electrical Development Association's exhibit on Stand B.5 at the Electrical Engineers' Exhibition at Earls Court from March 17 to 21. The exhibit will mainly illustrate the advantages to industry arising from the greater use of electronic control, and the introduction of automation.

PATENT SPECIFICATIONS

Continued from page 372

produced at lower cost and provides increased output with reduced feed pressure. The machine as a whole has fewer moving parts than known constructions and has higher output rates. It has simple adjustment for positive metering and is generally more simple and compact in construction than known pre-plasticizing injection moulding machines.

Shorter Abstracts

Polymerization of Ethylene. 805,142. Phillips Petroleum Co. Filed, March 16 1956.—Ethylene is polymerized at low pressures by means of a catalyst comprising a mixture of (a) an organic halide, (b) a trihalide or tetrahalide of a Group IV metal, and (c) one of the following metals: sodium, potassium, lithium, rubidium, cesium, beryllium, magnesium, zinc, cadmium, mercury, aluminium, gallium, indium or thallium.

Antioxidants. 805,368. Imperial Chemical Industries Ltd. Filed, September 7 1956. Addition to No. 763,283.—Compounds claimed as antioxidants are 4-alkoxyphenols substituted in the 2 or 3 position with a secondary alkyl (including cycloalkyl) radical of not more than 8 carbon atoms. The compounds are non-staining and have excellent anti-ageing and anti-flex cracking properties.

Natural Rubber Research Meetings

World leaders in natural rubber research and development will meet in Malaya in September to discuss boosting natural rubber in the race with synthetic, Mr R. M. E. Michaux, who is chairman of the International Rubber Research Board and the International Rubber Development Committee announced on February 26. He said that delegates would attend from countries who belonged to these two organizations. He added that by teamwork among botanists, agriculturists and scientists the natural rubber industry could be put in an even stronger position.

COMPANIES in the NEWS

US Rubber

Net income of United States Rubber Company in 1958, announced February 11, was $22,670,772, equivalent to $3.05 a share of common stock after preferred dividends, compared with $29,695,027, of $4.27 a share, in 1957. Net sales totalled $870,615,700 in 1958, ($873,583,074). A dividend of 50¢ a share on the common stock was declared, from earned surplus as of December 31 1958.

Rubber Markets

LONDON

Prices in the London rubber market have fluctuated narrowly during the past week but the tone generally has been quite firm and an all-round improvement has been recorded compared with previous levels. A certain amount of Russian buying helped to sustain the market while the good American consumption figures for January had a favourable effect. Prices are widely around ¾d. higher with the Spot 7/16d. up at 25⅞d.

Latest prices are as follows:

No. 1 RSS Spot: 25¾d.-26d.
Settlement House:
April 25⅞d.-26¼d.
April/June 26d.-26¼d.
July/September 26¼d.-26⅜d.
October/December 26¼d.-26½d.
January/March 26⅜d.-26⅝d.
No. 1 RSS cif basis ports:
March 25½d.-25¾d.
April 25⅝d.-25⅞d.
Godown:
March 86⅝ Straits cents nominal.

Latex

Centrifuged latex per gallon in drums, March/April shipment, 15s. seller, cif European ports. Spot, seller, 15s. 8d. Bulk, seller, 15s. 6d. Creamed, seller, 14s. 9d. Normal, seller, 11s. 6d.

SINGAPORE

The market opened unchanged on March 2 from previous official closing levels and ruled quiet, fluctuating within narrow limits. There was fair interest in lower grades but offers were extremely scarce. In the afternoon lower grades were still difficult to come by with No. 1's steady on trade interest. There was little trading and the market closed quietly steady. After hours, quiet conditions prevailed.

	Straits cents per lb., fob Malayan ports to open ports	
	Close	Previous Close
No. 1 RSS, March	86½—86¾	86¾—87
April	87⅛—87⅞	87⅛—87⅞
No. 2 RSS, March	85⅜—85⅞	85¼—86¼
No. 3 RSS, March	84⅛—85⅛	84¾—85¼
No. 4 RSS, March	83½—84	83½—84½
No. 5 RSS, March	81 —82	80⅜—81⅜
No. 1 RSS, Spot..	86¼—86¾	86¼—86¾
No. 3 blanket, thick remilled, March	79 —81	79 —81
No. 1 fine pale crepe, March ..	89 —91	89½—91½
Thin brown crepe, Spot	79¼—80¼	—

Tendency: Quiet

The Industrial Syndicate quote latex, native produce, 60% centrifugal, packed in rec. drums fob at 165.20d. per gallon.

BANGKOK

No. 1 RSS

The price for No. 1 RSS, at Bangkok on March 2 was 28.00 (28.00) US cents per lb.

NEW YORK

The following landed prices ruled in New York on March 2:

Dealers' Prices

	US cents per lb. March 2	Previous
No. 1 RSS, March	30⅞b–31a	30⅛b–30⅜a
April	30⅜b–31a	30⅛b–30⅜a
No. 2 RSS, March	30b –30⅛a	30b –30¼a
April	30b –30⅛a	30b –30¼a
No. 3 RSS, March	30⅛b–30⅜a	29⅞b–30a
April	30⅛b–30⅜a	29⅞b–30a
No. 1 RSS, Spot	30⅞b–31a	30⅛b–30⅜a
No. 3 amber blanket crepe, March	28⅞b–29⅛a	28⅞b–29a
No. 1 latex, thin crepe, March	31n	30⅛n
No. 1 latex, thick crepe, March	30⅛n	30¼n

Futures—Rex Contract

	Close	Prev. Close
March ..	30.85b–30.95a	30.55t
May ..	31.07 –31.05t	30.65b–30.70a
July ..	31.05t	30.70t
Sept. ..	31.05 –31.08t	30.70t
Nov. ..	31.05b–31.08a	30.65b–30.70a
Jan. ..	31.00b–31.08a	30.65t
March ..	31.00b–31.08a	30.65b–30.70a

Sales: 164 Tendency: Firm

Rubber futures were firm and active on commission house buying on March 2. Traders said the active factory buying in the physical market was easily absorbed. Rubber was offered with dealers covering their needs in the shipment market. The undertone of physicals was firm.

Crepe Rubber

The following prices ruled in New York on February 25:

Dealers' selling prices:	Cents per lb.
Sole crepe, standard grade 'A'	48 (48)
Thick crepe	32 (32)

Synthetic Rubber

The following prices ruled in New York on February 25:

	Cents per lb.
GR-S	23.25 fas New Orleans
Neoprene GN ..	41 fob Louisville
Neoprene W ..	39 „ „
Butyl	23 fas New Orleans
Paracril.. ..	50 fob Baton Rouge

AMSTERDAM

The Amsterdam rubber market ruled as follows on March 2:

	Guilders per kilo	
No. 1 RMA	March 2	Previous
March	2.47	2.47
April..	2.50	2.50
May	2.50	2.50
June	2.50	2.50
April/June	2.50	2.50
July	2.51	2.51
August	2.51	2.51
September	2.51	2.51
July/September ..	2.51	2.51

Sales: 30 Tendency: Quiet

CEYLON

No. 1 RSS

The price for No. 1 RSS, spot, at Colombo on March 2 was 106 (106) Ceylon cents per lb.

DJAKARTA

After a steady opening on March 2, values tended to ease. Lower grades and crepe rubber were in good demand. The close was easier with export certificates quoted at 332 paid/buyer.

	Rupiahs per kilo March 2	Previous
Spot, No. 1 Priok ..	22.10b	22.15b
Spot, No. 2 Priok ..	21.15b	21.15b
Spot, No. 3 Priok ..	19.70b	19.80b
No. 1 fine pale crepe..	19.75b	19.75b

Tendency: Easier

Canadian Tyre Sales

The Rubber Association of Canada reports that the high level of replacement tyre sales which marked the second half of 1958 continued during December and combined with an encouraging increase in original equipment sales raised total sales of pneumatic tyres for the year to a new record in the history of the Canadian tyre industry.

According to Greig B. Smith, Association manager, December sales of 660,262 units were slightly less than November sales of 666,518 units, but exceeded December 1957 sales of 455,037 units by 45%. December production, amounting to 754,274 units, was practically equal to November production of 754,723 units and surpassed December 1957 production of 576,163 units by 31%.

Total 1958 sales of 8,061,460 units exceeded total 1957 sales of 7,790,375 units by about 3½% and previous record sales of 7,817,759 units in 1956 by approximately 3%. Total 1958 production at 7,800,067 units was less than 1% below 1957 production of 7,864,464 units but about 7% less than the record 1956 production of 8,372,117 units.

Commenting on the 1958 sales figures, Mr Smith pointed out that the increase in total sales had been achieved through a substantial rise in replacement sales from 5,385,076 units in 1957 to 5,937,754 units in 1958, an increase of more than 10% which had heavily outweighed a decline in original equipment sales from 2,216,936 units in 1957 to 1,999,294 units in 1958, a decrease of slightly less than 10%. The increase in replacement sales was spread over all major categories of tyres, with passenger tyres rising from 4,693,207 to 5,176,848; truck tyres from 550,387 to 598,806 and tractor and implement tyres from 97,680 to 115,450. In the original equipment field, sales of passenger tyres dropped from 1,777,630 in 1957 to 1,570,918 in 1958, and truck tyres from 249,852 to 225,813, but tractor and implement tyres reversed the over-all trend rising from 158,840 to 170,085.

Industry INTELLIGENCE

Technical Data

Hypalon Cellular Rubber

The compounding of Hypalon 20 to produce cellular products is discussed in Report BL-342, by H. H. Klever and R. W. Bedwell, issued by the Elastomer Chemicals Department, E. I. du Pont de Nemours and Co. (Inc.), Wilmington 98, Del., USA. Formulations are given for low-density material of the closed-cell and the open-cell types, the new curing system for Hypalon involving the use of resins instead of inorganic oxides being used in one of the closed-cell formulations. Conventional compounding and processing are generally applied to the production of Hypalon 20 cellular rubber. There are, however, certain important differences, notably the more rapid softening of Hypalon 20 during working on a mill or in an internal mixer. An adequate flow of cold water should therefore be maintained through the mill or mixer to prevent excessive thermal softening of the compound.

Data for the properties of cellular Hypalon 20 show that it has low water absorption, good weathering and colour stability, and excellent resistance to ozone. This combination of properties suggests the use of cellular Hypalon 20 for car seals and gaskets, boating accessories and weather stripping. In the industrial field, the material should prove advantageous for low-pressure sealing, wipers, applicators and safety equipment.

Foamable Polystyrene

The production of expanded polystyrene of the closed-cell type from foamable beads of polystyrene containing a blowing agent is described in detail in Laboratory Report LP.2/1, issued by Monsanto Chemicals Ltd. (Plastics Division), Monsanto House, 10-18 Victoria Street, London, S.W.1. If the beads are loaded directly into moulds and heat is applied, uneven expansion takes place due to uneven distribution of the beads within the mould. This will cause distortion and shrinkage of the moulded article on cooling.

It is therefore recommended that expansion of the beads should take place in two stages. In the first stage the beads are expanded by heat to yield lightweight granules, usually termed 'prefoam.' After a short conditioning period, the granules are heated again in a mould to expand them slightly more and to fuse and weld them together into the final block or shape. Either steam or hot water can be used as the heating medium and the procedure for both stages is fully described in the report. Cutting of blocks of the finished product can be carried out either by means of a water-lubricated band saw or an electrically-heated wire.

Vinamul Synthetic Resin Emulsions

Vinamul synthetic resin emulsions are widely used in the manufacture of clear and pigmented surface coatings as adhesives and binding agents and for the finishing of textiles, paper and leather. The characteristics and applications of Vinamul synthetic resin emulsions are summarized in an introductory leaflet, while detailed information on their properties, plasticization, storage and handling is given in a series of technical data sheets issued by Vinyl Products Ltd., Carshalton, Surrey.

Five types of thermoplastic synthetic resins are used in the production of Vinamul emulsions, while there are a number of standard grades of emulsion for each type of resin. The resins and the number of standard grades of emulsion for each type (in brackets) are as follows: Polyvinyl acetate (20), vinyl acetate copolymers (5), polymethacrylates (6), polystyrene (2) and styrene copolymers (2). The emulsions contain no organic solvents and are non-inflammable, non-toxic and practically odourless. They can be thinned with water in all proportions, and equipment used to handle them is easily cleaned with water immediately after use.

Small quantities of water-soluble materials, added during manufacture to stabilize the emulsions, exert a considerable effect on the properties of the emulsions and give each resin particle a minute electrical charge which may be either negative or positive. The majority of the Vinamul synthetic resin emulsions are negatively charged but a number of positively charged grades are included. The various types and grades differ in regard to the chemical nature, molecular weight and concentration of the resin; the nature of the water-soluble materials; and the particle size, viscosity and stability. The emulsions can be extensively modified by the addition of pigments, dyes, fillers, plasticizers, solvents and thickening agents.

In general, the resin films deposited by Vinamul emulsions are colourless, odourless, tasteless and non-toxic and they are unaffected by sunlight, oxidation, ageing and microbial attack. The resin films are insoluble in water but dissolve readily in many organic solvents. Some of the resins are soft and flexible but others are brittle, and plasticizers such as dibutyl phthalate must be added if flexible films are required. Plasticization increases the thermoplasticity and tackiness of the resins while it also assists film integration, thereby improving the gloss, clarity and water resistance of the films. Unplasticized and plasticized Vinamul emulsions of each range can be blended in all proportions to obtain products with intermediate properties.

An alternative version of its Fortiflex rubber resin fuel hod is now being marketed by Dunlop. The new hod, which carries a two-year guarantee, is straight-sided and has a larger capacity than the previous tapered type, whilst retaining all its advantages. These are, it is claimed, that it is strong, silent and easy to handle; cannot chip, crack or be dented; is proof against rust and corrosion; and cannot cause damage to tiles, walls or floors. The retail price is £1 19s. 3d.

Publications Received

Noralduct Sheet and Tube

A folder with the title 'Noralduct,' describing the product of that name now being produced by the Northern Aluminium Co. Ltd., Banbury, has been issued by the company. 'Noralduct' is solid aluminium sheet having internal systems of passages and ducts. It is suitable for heat transfer equipment and, as the integral passages can follow almost any complex continuous pattern that can be drawn on paper, there are many other possibilities. Sheets of Noralduct can be formed after manufacture, as are those used in refrigerator evaporator components, for example. Either a plain or an impressed pattern finish is available and colour can be included in the product design as there are no welds to spoil the appearance of an anodized finish. The folder includes lists of the present uses of 'Noralduct' and some of the possible ones, together with a short description of its manufacture, and a guide to its present tolerances and manufacturing limits.

Carter Handwheel Controls

Dimensions and descriptions of the handwheel controls for 'F' Type Carter hydraulic infinitely variable speed gears are given in Leaflet DFC/3 of Carter Gears Ltd., Thornbury Road, Bradford, Yorks. This leaflet is a new publication on existing products and does not show items which have not previously been available but merely presents their features in a more concise form.

Buss Ko-Kneader

The applications and properties of Ko-Kneaders, manufactured by Buss Ltd., Basle, Switzerland, are outlined in the company's illustrated brochure

'Ko-Kneader List System.' The characteristic feature of these machines is that an axial movement of the worm is coordinated with its rotating movement. In this way the worm can pass the kneading teeth without getting jammed. The mixing and kneading process of the resulting movement is illustrated diagrammatically in the brochure by a series of pictures showing eight phases of one worm rotation. Ko-Kneaders were described in detail in *RJIP* of January 4 1958 under the heading 'Recent Progress in the Industries.'

New Laboratory

Details of the new research laboratory at Cambridge of the Cambridge Instrument Co. Ltd., construction of which was recently commenced, appear with illustrations the 'Cambridge Instrument Co. Ltd. News' for January. Also included in this issue is a description of the Cambridge Numalec automatic pneumatic/electric controller.

The Vickers Magazine

Overseas house organ of the Vickers group of companies, The Vickers Magazine: Winter 1958-59, conforms to its usual high standard of colourful presentation. It contains items on motorways, crankshaft forging, and hydraulics, etc.

BSI and Plastics

The January issue of *BSI News*, the organ of the British Standards Institution, contains many items of interest including, particularly, the fourth article in the series, 'How British Standards Serve the User.' This one, which deals with plastics, explains the foundation and structure of the industry and outlines some of the 60 British standards connected with it.

Encapsulation in 'Araldite'

The protection and insulation of electrical components and circuitry against mechanical damage, damp, etc., by the encapsulation of 'Araldite' epoxy resins, is described fully in 'Technical Notes 193,' from the Technical Service Department of Ciba (ARL) Ltd., Duxford, Cambridge. The methods of encapsulation considered are those used by E. K. Cole and Co. Ltd., at Malmesbury.

Research in Ceylon

Results of research into 'Prevention of Coagulation in the Field,' and 'The White Root Disease of Hevea Fomes Lignosus,' are given in the Rubber Research Institute of Ceylon Advisory Circulars, Nos. 61 and 62, respectively.

Carbon Black

Various aspects of carbon black are discussed in the latest three numbers of 'Columbian Colloidal Carbons,' issued by Columbian Carbon Co. and distributed in the UK by Columbian International (Great Britain) Ltd., 116 Cannon Street, London, E.C.4. In Vol. 16, No. 1, evidence is presented for the existence of quinone and aromatic hydroxyl groups on the surface of carbon black particles. A mechanism for the chemical interaction of carbon blacks with elastomers is proposed on the basis of these functional groups.

Vol. 16, No. 2, relates to techniques for preparing carbon black masterbatches, special reference being made to the Columbian process for making masterbatches by incorporating carbon black in synthetic rubber latex. It is mentioned that masterbatches of carbon black in synthetic resins and thermoplastics have been in commercial production for many years.

Vol. 16, No. 3, dealing with the dispersion of carbon black in rubber, is in two parts. In the first part, methods of evaluating the state of dispersion of carbon black in rubber are surveyed while in the second part, the effect of various processing and compounding factors in relation to the control of dispersion are discussed. Several methods of preparing masterbatches are shown to be outstanding for the development of improved dispersion of carbon black in SBR for tread compounds.

Machines, Materials and Equipment

Storeys' 'Con-Tact' on Plaster

Storeys of Lancaster have just completed a long-term investigation into the adhesion of their plaster, 'Con-Tact,' to new plaster. This proved to be very successful and a new use has thus been found for this plastic sheeting which is self-adhesive, easily cleaned, hard wearing, waterproof, steamproof and mothproof and will not crack or blister.

In the laboratories three types of plaster-board finish plaster, Hardwall plaster, and sand and lime plaster were prepared and laid on to the walls with a good smooth finish. Part of each type of plaster was primed with a variety of priming agents before the 'Con-Tact' was applied. After eight months the condition of the 'Con-Tact' on these walls is very good and the ease of maintenance and cleaning has been confirmed. The colours have not faded in any way.

It is a matter of individual judgment as to whether the plaster should be primed or not, but provided the plaster is smooth and well finished the use of a primer would seem to be unnecessary.

The technical personnel at Storeys of Lancaster would be very pleased to give advice to anyone who is proposing to apply 'Con-Tact' to any area in large quantities as a wall covering and, in particular, to advise on the question of priming. Storeys will supply a suitable priming agent on request.

High Frequency Plastic Welding

A new advance in high frequency plastic welding is announced by H. F. Industrial Services Ltd., which has produced a welding machine, the Acme No. 2, the outstanding quality of which is, the makers claim, its freedom from 'flash' at very high frequencies. This new machine, a development of the earlier model, Acme No. 1, operates at frequencies above the 73 m/c range. A new innovation is the use of stabilized metal rectifiers from which a working life in excess of 15 years may be reasonably anticipated. The machine is suitable for the welding of cellulose acetate and other rigid or unplasticized materials.

Polystyrene Film

A new transparent polystyrene packaging film is being supplied by Monsanto Chemicals Ltd. This film, known as Polyflex 150, is the latest addition to the Polyflex range manufactured by the Plax Corporation in the US and which Monsanto has been marketing in Britain since last May. Polyflex 150 is produced in gauges of 0.001in., 0.00125in., 0.0015in. and 0.002in., and in roll widths ranging from 2½in. to 42in. by increments of one sixteenth of an inch. It is flat, non-curling and wrinkle-free. Its toughness and brilliant clarity make it ideal for many visual packaging applications. The film is odourless, tasteless and non-toxic and has low moisture-vapour and gas transmission rates.

The 1959 range of rubber bathing caps manufactured by Kleinerts, 91 New Bond Street, London, W.1, includes a model with a brim—the forerunner of an entirely new style, according to the manufacturers. Another, which has been designed with the fashion-conscious woman in mind, is a watertight version of the popular poodle hat. Over 80% of the new range is strapless. The 'Silhouette,' *left*, comes in white, red, royal or aqua. It retails at 6s. 11d. (strapless) and 7s. 6d. (with strap). Retailing at 12s. 6d., the 'Pinespray,' *right*, is available in white, red, royal, black, yellow and aqua

Future Events

INSTITUTION OF THE RUBBER INDUSTRY

Merseyside Section. — Saturday March 7. Dinner dance at Reeces, Parker Street, Liverpool.

Manchester Section. — Monday March 9 at Newton Heath Technical College at 6 p.m. 'Chemical Plant Lining,' by J. L. F. Crompton, A.I.R.I., Dunlop Rubber Co. Ltd. A practical paper for younger members of the rubber industry.

Midland Section.—Monday March 9 at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 6.45 p.m. 'Some Aspects of the Work of the Road Research Laboratory,' by Dr H. J. H. Starks, Road Research Laboratory. Joint meeting with the Auto Division of the Institution of Mechanical Engineers.

South Wales and Monmouthshire Section.—Monday March 9 at the Angel Hotel, Cardiff, at 7.30 p.m. 'Methods and Technique of Carbon Black Manufacture,' by D. L. H. Allan, M.A., Philblack Ltd.

Burton-on-Trent Section.—Tuesday March 10 at the George Street Club, George Street, Burton-on-Trent, at 7.30 p.m. 'Butyl in Mechanical Goods,' by M. E. Blouin, B.Sc., Polymer (UK) Ltd.

London Section. — Tuesday March 10 at the Royal Society of Tropical Medicine and Hygiene, Manson House, 26 Portland Place, London, W.1. At 5.30 p.m., 'Process Control in the Rubber Industry,' by L. R. Mernagh, B.Sc., F.R.I.C., Firestone Tyre and Rubber Co. Ltd. At 7 p.m. 'Fluorinated Polymers,' by R. R. Radcliffe, E. I. Du Pont de Nemours and Co.

West of England Section.—Wednesday March 11 at 7.45 p.m. 'Some Applications of Rubber in Bogie Design,' by J. Burnham, A.M.I. Loco.E., technical services manager, Geo. Spencer, Moulton Ltd.

PLASTICS INSTITUTE

Members of the Plastics Institute are invited to the March 10 meeting of the London Section, Institution of Rubber Industry.

Tenth Annual Lecture of the Institute will be held on Thursday March 10. 'International Competition in the Chemical Industry,' by S. P. Chambers, C.B., C.I.E., I.C.I. Ltd.

South Wales and Monmouthshire Section.—Wednesday March 11 at the Angel Hotel, Westgate Street, Cardiff, at 6.30 p.m. 'PTFE' Imperial Chemical Industries Ltd.

Yorkshire Section. — Wednesday March 11 at St. Mark's House, 186 Woodhouse Lane, Leeds. 'The Assessment of Cure,' by A. A. Tomkins, Joseph Lucas Ltd.

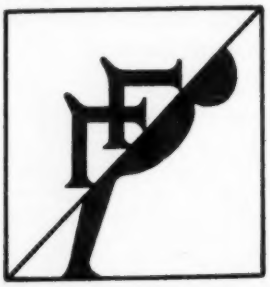
Midlands Section.—Friday March 13 at the Chadwick Manor Hotel, Knowle. Dinner and Dance.

London and District Section.—Tuesday March 17 at the Wellcome Building, 183-193 Euston Road, London, N.W.1 at 6.30 p.m. Chairman's Lecture; 'Plastics — Why Should I Worry,' by D. S. Mahon, B.Sc., Bakelite Ltd.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from "The Trade Marks Journal"—given below are reproduced by permission of the Controller of H.M. Stationery Office.

RESOLITE (778,256) For plastics included in Class 17 in the form of films, rods, tubes, foils and of shaped sections, none being for packing purposes; and adhesive tape included in Class 17; but not including foamed plastics. By Ciba (ARL) Ltd., Duxford, Cambridge. To be associated with No. 626,611 (3501, 222) and another. (Class 17; February 11 1959.)



(B780,091) For plastics included in Class 17 in the form of sheets, rods, tubes, blocks, strips and of shaped sections. By Ly-Bak Ltd., Rose Works, Victoria Road, Portslade, Sussex. To be associated with No. B780,089 (4205, 162). (Class 17; February 11 1959.)

PILLOPRENE (778,029) For all goods included in Class 19 made of plastics. By Jobro Ltd., Clifton House, 83-117 Euston Road, London, N.W.1. To be associated with No. 763,217 (4121, 700) and others. (Class 19; February 11 1959.)

EPICON (782,511) For holloware included in Class 21; and tubes and rods, all made of glass fibres or of glass fibre fabrics bonded together with resin, the glass fibre material predominating, and being for use in manufacture. By Ogden Smiths and Hussey Ltd., King Henry's Drive, New Addington, Croydon, Surrey. To be associated with No. 771,480 (4156, 233). (Class 21; February 11 1959.)

PERMACAST (783,064) For all goods included in Class 21 made from plastics reinforced with powdered or fibrous materials. By Permali Ltd., 125 Bristol Road, Gloucester. To be associated with No. 748,451 (4057, 211) and others. (Class 21; February 11 1959.)

PATENT LIST

Printed copies of the Specifications in the following list can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

Open to public inspection on March 4 1959

O. B. Rasmussen. Method of producing synthetic organic fibrous materials. 810,001.

Phillips Petroleum Co. Vapor phase polymerization of certain 1-olefins. 809,784.

Spooner Dryer and Engineering Co. Ltd. Method and apparatus for the polymerizing of resins on moving material. 809,821.

Dunlop Rubber Co. Ltd. Natural rubber articles. 809,743.

Imperial Chemical Industries Ltd. Polymeric compositions. 809,745.

Deutsche Gold- und Silberscheideanstalt vorm Roessler. Metallizing fully synthetic high polymer textile fibres. 809,958.

Imperial Chemical Industries Ltd. Process for shaping resinous materials. 810,008.

Ciba Ltd. Acid derived from an alkaloid named deserpidine, its esters and salts thereof, and process for their manufacture. 809,913.

S. a.r. L. Jop and S. a.r. L. Etablissements Taulet and Cie. Method of and apparatus for the bonding of thermoplastic sheet assemblies. 810,002.

Centre National de la Recherche Scientifique. Grafting polymers or copolymers. 809,838.

British Cellophane Ltd. Production of moisture-proof sheet wrapping materials. 809,749.

American Viscose Corporation. Humidifier with control system for humidifying articles or travelling webs of paper or regenerated cellulose. 809,694.

Goodyear Tire and Rubber Co. Pneumatic tyres. 810,014.

Firestone Tire and Rubber Co. Processing heat-shrinkable synthetic textile elements. 809,916.

United States Rubber Co. Water resistant polyurethane foams. 809,697.

United States Rubber Co. Method and apparatus for moulding a patterned surface on conveyor belts or other articles of a plastic material. 809,969.

E. I. du Pont de Nemours and Co. Modified formaldehyde polymers and method of preparing them. 809,754.

A. Abbey (Dow Chemical Co.). Manufacture of methyl sulphide and methyl mercaptan. 810,017.

Changes of Name

Resinoid and Mica Products Ltd. (450,932), 28 Queen Annes Gate, London, S.W.1.—Name changed to Resoid Ltd., on December 23 1958.

NEW COMPANIES

Super-Plas (Wigan) Ltd. (619,234). —January 20. Capital: £500 in £1 shares. To carry on the business of manufacturers, workers, welders and fabricators of plastic materials, etc. The directors are: John Plumpton, cabinet maker, and Mrs Elsie Plumpton, both of 229a Ormskirk Road, Wigan, directors of Plumptons of Wigan Ltd., etc. Regd. office: 227b Ormskirk Road, Wigan.

Plastics Reinforced (Liverpool) Ltd. (619,273). — January 21. Capital: £25,000 in £1 shares. To carry on the business of fabricators, manufacturers, moulders and manipulators of and wholesale and retail dealers in plastic, thermoplastic, thermo-setting plastic materials, glass fibre, etc. The directors are: John E. Alexander, 'Denecourt,' Old Field Drive, Heswall; Charles W. Barclay (permanent managing director), 5 Mentmore Road, Liverpool, 18; John B. Barclay, Charles R. Barclay, Richard Fisher and Peter Wilson. Solicitors: Owen Dawson and Wynne-Evans, Liverpool 2.

Plasinter Co. Ltd. (619,482). — January 23. Capital: £2,500 in £1 shares. To carry on the business of manufacturers, prefabricators, producers, importers, exporters and processors of and dealers in and workers in plastic coated steel products and other goods, etc. The directors are: James J. Hurley, 16 Sharmans Cross Road, Solihull; Stanley J. Hurley, West Mount, Manor Road, Dorridge, Solihull; Geoffrey J. Hurley, Westway, Norton Green Lane, Knowle, directors of Darlaston Galvanized Holloware Co. Ltd. Regd. office: Progress Works, Holyhead Road, Wednesbury.

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A VACANCY occurs for a young rubber technologist of L.I.R.I. standard. Experience in footwear compound would be an advantage. This is an opening with good prospects. Applications, which will be treated with confidence, should be addressed to:—Sam Kay Rubber Co., Ltd., Hope Mill, Portwood Place, Stockport. (256)

IMPERIAL CHEMICAL INDUSTRIES LTD., Plastics Division, has a vacancy for a rubber technologist for work on synthetic rubbers in its Technical Service and Development Department at Welwyn Garden City. Applications are invited from men in the age range 25/30 of L.I.R.I. standard, and with experience of the rubber industry. The company works a five-day week in pleasant surroundings, and pension and profit-sharing schemes are in operation. For married men some assistance may be given towards house purchase, and temporary lodging allowances are also available. Apply briefly to the Staff Manager, Imperial Chemical Industries Ltd., Plastics Division, Black Fan Road, Welwyn Garden City, Hertfordshire. (296)

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APPOINTMENTS VACANT (continued)

PRODUCTION planning clerk for electric cable factory in Middlesex. Preference given to applicant with good knowledge of rubber and thermoplastic cables and manufacturing processes. Good salary, pension. Write stating age, experience, salary required.—Box 303. (303)

RUBBER technologist required by the British Rubber Producers' Research Association for research and development work, involving close collaboration with research teams of physicists and chemists. Qualifications looked for are a good degree in physics or chemistry, together with practical experience in rubber technology. The appointment will be made depending upon qualifications, age and experience within the salary range £670—£1,530, plus children's allowance, with superannuation under the F.S.S.U. scheme. Promotion to higher grades depends on ability and service. Apply to:—The Director of Research, B.R.P.R.A., 48-56 Tewin Road, Welwyn Garden City, Herts. (292)

RUBBER manufacturers require two chargehands or foremen. Shift work. Moulding experience desirable but not essential, must be sound disciplinarian used to handling labour. Permanent position, good wages.—Apply Box 293. (293)

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